



OFFICE OF THE PRESIDENT

January 24, 2013

Vice Chancellor Susan Jeffords
University of Washington, Bothell
Box 358522

Dear Susan:

Based upon the recommendations of the Executive Council, the General Faculty Organization has recommended approval of a Bachelor of Science degree in Mathematics. A copy of the approval is attached.

I am writing to inform you that the Science and Technology program is authorized to specify these requirements beginning autumn quarter 2012.

The new requirements should be incorporated in printed statements and in individual department websites as soon as possible. The *General Catalog* website will be updated accordingly by the Registrar's Office.

Sincerely yours,

A handwritten signature in black ink, appearing to read "Michael K. Young".

Michael K. Young
President

Enclosure

cc: Dr. Linda Simonsen (with enclosure)
Mr. Robert Corbett (with enclosure)
Dr. Deborah H. Wiegand (with enclosure)
Ms. Virjean Edwards (with enclosure BST-20120711)



UNIVERSITY OF WASHINGTON

CREATING AND CHANGING UNDERGRADUATE
ACADEMIC PROGRAMS

NOV 09 2012

JUL 27 2012

OFFICE USE ONLY

Control #

BST-20120711

After college/school/campus review, send a signed original and 8 copies to the Curriculum Office/FCAS, Box 355850.

For information about when and how to use this form: <http://depts.washington.edu/uwcr/1503instructions.pdf>

College/Campus UW Bothell	Department/Unit Science & Technology	Date July 11, 2012
New Programs <input type="checkbox"/> Leading to a Bachelor of _____ in _____ degree. <input checked="" type="checkbox"/> Leading to a Bachelor of <u>Science</u> degree with a major in <u>Mathematics</u> <input type="checkbox"/> Leading to a _____ Option within the existing major in _____. <input type="checkbox"/> Leading to a minor in _____		
Changes to Existing Programs <input type="checkbox"/> New Admission Requirements for the Major in _____ within the Bachelor of _____. <input type="checkbox"/> Revised Admission Requirements for the Major in _____ within the Bachelor of _____. <input type="checkbox"/> Revised Program Requirements for the Major in _____ within the Bachelor of _____. <input type="checkbox"/> Revised Requirements for the Option in _____ within the major in _____. <input type="checkbox"/> Revised Requirements for the Minor in _____.		
Other Changes <input type="checkbox"/> Change name of program from _____ to _____. <input type="checkbox"/> New or Revised Continuation Policy for _____. <input type="checkbox"/> Eliminate program in _____.		
Proposed Effective Date: Quarter: <input checked="" type="checkbox"/> Autumn <input type="checkbox"/> Winter <input type="checkbox"/> Spring <input type="checkbox"/> Summer Year: 20 12		

Contact Person: Linda Simonsen	Phone: 425-352-3223	Email: LSimonsen@uwb.edu	Box: 358538
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EXPLANATION OF AND RATIONALE FOR PROPOSED CHANGE For new program, please include any relevant supporting documentation such as student learning outcomes, projected enrollments, letters of support and departmental handouts. (Use additional pages if necessary).
Proposal Attached

OTHER DEPARTMENTS AFFECTED List all departments/units/ or co-accredited programs affected by your new program or changes to your existing program and acquire the signature of the chair/director of each department/unit listed. Attach additional page(s) if necessary. *See online instructions.		
Department/Unit:	Chair/Program Director:	Date:
Department/Unit:	Chair/Program Director	Date:

CATALOG COPY

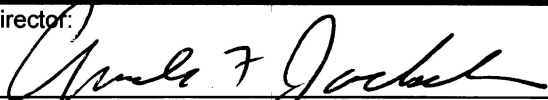
Catalog Copy as currently written. Include only sections/paragraphs that would be changed if your request is approved. Please cross out or otherwise highlight any deletions.

PROPOSED CATALOG COPY

Reflecting requested changes (Include exact wording as you wish it to be shown in the printed catalog. Please underline or otherwise highlight any additions. If needed, attach a separate, expanded version of the changes that might appear in department publications).
Please note: all copy will be edited to reflect uniform style in the General Catalog.

APPROVALS

Chair/Program Director:



Date:

7/12/2012

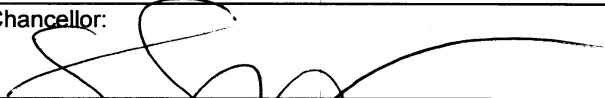
College/School/Campus Curriculum Committee:



Date:

7/12/2012

Dean/Vice Chancellor:



Date:

7/17/12

Faculty Council on Academic Standards/ General Faculty Organization/Faculty Assembly Chair:



Date:

7/12/2012

POST TRI-CAMPUS APPROVAL (when needed)

Faculty Council on Academic Standards/ General Faculty Organization/Faculty Assembly Chair:



Date:

11/06/12

**University of Washington Bothell
Application For a New Degree**

**Bachelor of Science
In Mathematics**

**Science and Technology Program
May 2012**

FORM 2

COVER SHEET
NEW DEGREE PROGRAM PROPOSAL

Part I requires the completion of the following forms: Appendices B-4, B-5, and B-6.

Program Information

Program Name: Mathematics

Institution Name: University of Washington Bothell

Degree Granting Unit: Science and Technology

(e.g. College of Arts and Science)

Degree: BS Level: Bachelor Type: Science

(e.g. B.S. Chemistry) (e.g. Bachelor) (e.g. Science)

Major: Mathematics CIP Code: 27.0101

(e.g. Chemistry)

Minor: NA

(if required for major)

Concentration(s): NA

(if applicable)

Proposed Start Date: Autumn 2012

Projected Enrollment (FTE) in Year One: 15 Full Enrollment by Year: 2015: 30 FTE

(# FTE) (# FTE)

Proposed New Funding: 280,000.00

Funding Source: ☒ State FTE ☐ Self Support ☐ Other

Mode of Delivery / Locations

Campus Delivery UW Bothell Campus

(enter locations)

Off-site

(enter location(s))

Distance Learning

(enter formats)

Other

Note: If the program is the first to be offered at a given site or location, the submission must also include the information required for the establishment of a new teaching site as outlined in section B.1 of the Program and Facility Approval Policy and Procedures.

Scheduling

☒ Day Classes ☒ Evening Classes ☐ Weekend Classes

Other (describe)

Attendance Options

☒ Full-Time

☒ Part-Time

Total Credits: 90 Quarter Semester

Contact Information (Academic Department Representative)

Name: Linda Simonsen, Ph. D.
Title: Professor, Science and Technology
Address: University of Washington-Bothell
18115 Campus Way N.E.
Box 358534
Bothell, WA 98011-8246

Telephone:

FAX:

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I. Introduction

The University of Washington Bothell proposes to offer a Bachelor of Science degree in Mathematics. Mathematics is an established and growing field with students pursuing careers in engineering, actuarial science, database and computer systems administration, network and data communication analysis, statistical analysis, secondary mathematics teaching, and other fields. Additionally, many students with a major in mathematics pursue graduate study in mathematics, physics, engineering, and other areas of study.

A. Program Description

While the proposed curriculum represents a standard mathematics degree, the courses offered also reflect the recommendations put forth by the Mathematical Association of America's (MAA) Committee on the Undergraduate Program in Mathematics (CUPM) *Curriculum Guide 2004* for majors preparing to be secondary mathematics teachers. According to MAA, mathematical sciences majors preparing to teach secondary mathematics should:¹

- *Learn to make appropriate connections between the advanced mathematics they are learning and the secondary mathematics they will be teaching. They should be helped to reach this understanding in courses throughout the curriculum and through a senior-level experience that makes these connections explicit.*
- *Fulfill the requirements for a mathematics major by including topics from abstract algebra and number theory, analysis (advanced calculus or real analysis), discrete mathematics, geometry, and statistics and probability with an emphasis on data analysis;*
- *Learn about the history of mathematics and its applications, including recent work;*
- *Experience many forms of mathematical modeling and a variety of technological tools, including graphing calculators and geometry software.*

B. Relationship to Institutional and Unit Priorities

"There are things which seem incredible to most men who have not studied mathematics." -Aristotle

1. Mission of University of Washington Bothell

The University of Washington Bothell Mission Statement includes, "UW Bothell holds the student-faculty relationship to be paramount. We provide access to excellence in higher education through innovative and creative curricula, interdisciplinary teaching and research, and a dynamic community of multicultural learning." The proposed degree in Mathematics supports the mission by presenting an intentional program informed through an interdisciplinary process.

¹ Mathematical Association of America (2004). Undergraduate Programs and Courses in the Mathematical Sciences: CUPM Curriculum Guide 2004. Ret May 2011: http://www.maa.org/cupm/curr_guide.html.

The process began in 2006 with the Applied Science and Technology Planning Committee Phase I Report, [PDF]. September 2006, Vice Chancellor of Academic Affairs Thomas Bellamy formed the Applied Science and Technology Planning (ASTP) group to make recommendations regarding future applied science, science, and technology programs at UW Bothell. The report identified potential programs through analysis of regional workforce needs, student demand and interest, and successful programs elsewhere. Phase 1 was followed by the STEM Task Force appointed by Vice Chancellor Susan Jeffords in January 2008 to make recommendations regarding future growth in science, technology, engineering and mathematics fields (STEM) at UW Bothell, [PDF]. In January 2011 the Mathematics and Quantitative Reasoning Task Force (MQRTF) was charged to consider how UW Bothell moves forward initiatives for mathematics and quantitative reasoning across the curriculum. The outcome is the realization of a Mathematics degree that demonstrates the following tenets from UW Bothell's mission:

- *Emphasize and develop critical thinking, writing, and information literacy, in order to graduate students with life-long learning skills.*
- *Actively recruit and support outstanding faculty scholars with a passion for communication.*
- *Build an inclusive and supportive community of learning and incorporate multicultural content and diverse perspectives on ethnic and racial groups, gender, sexual orientation, social class, and special needs.*

2. Program Priorities

The 21st Century Initiative establishes seven priorities for the University of Washington Bothell through the year 2020. Growth as a priority states, "Serve the citizens of the State of Washington by providing access to a premier university education.", and places special emphasis on developing new degree programs that respond to the economic development needs of the state and region and to demographic changes. The areas of Science, Technology, Engineering and Math (STEM) were identified as top priorities for immediate growth.² The proposed degree supports identified priorities and will be housed in the Science and Technology Program. It will emphasize UW Bothell's strength in collaborative scholarship by extending curriculum that supports education, engineering, and technology.

II. Documentation of Need for Program

"In this changing world, those who understand and can do mathematics will have significantly enhanced opportunities and options for shaping their futures. Mathematical competence opens doors to productive futures." - National Council of Teachers of Mathematics

² UW Bothell (July 2008). The 21st Century Campus Initiative: University of Washington Priorities Plan 2008-2020. Retrieved March 2010, <http://www.uwb.edu/21stcentury/>.

The national perspective holds that U.S. must improve student performance in Science and Math to compete in a global economy. It was reported in 2010, that U.S. ranked 25th out of 34 Organization for Economic Cooperation & Development (OECD) countries in math scores among fifteen-year-olds.³ The Department of Education uses the Trends in International Mathematics and Science Study (TIMSS) to determine performance in mathematics and science achievement of U.S. 4th- and 8th-grade students compared to that of students in other countries. The TIMSS report shows gradual improvement since 1995 in U.S. students.⁴ Foremost, however, is the fact that we must commit resources and increase opportunities for STEM education if we want to produce an educated citizenry who can contribute to the welfare of the nation.

A. National Demand

Mathematics is a STEM discipline and is recognized as a field where immediate production in graduates is needed both nationally and regionally. Graduates can pursue advanced education in numerous disciplines and various career paths. Some common fields in which mathematicians study and find work are computer science and software development, physics, engineering, and operations research.⁵ Thus, demand is also spurred by rapid advances in technology. The following table conveys projected national demand in several occupations that require mathematics or education with rigorous mathematics requirements.

Occupational Title		Employment	Projected Empl.	Change, 2008-18	
		2008	2018	Number	Percent
Mathematicians		2,900	3,600	700	22
Actuaries		19,700	23,900	4,200	21
Database administrators		120,400	144,700	24,400	20
Network and computer systems administrators		339,500	418,400	78,900	23
Network systems and data communications analysts		292,000	447,800	155,800	53
Operations research analysts		63,000	76,900	13,900	22
Statisticians		22,600	25,500	2,900	13

Table 1: OES - Occupations for Mathematics

The percent change column reveal faster than average growth for all positions and ONet online reports the outlook as "bright" for these occupations. This is a only partial listing of occupations as noted in OES. Data for educators/teachers was aggregated and is not included in the table but the demand for STEM educators at all levels is strong.

³ John Hechinger (2010). U.S. Teens Lag as China Soars on International Test. Retrieved May 2011, <http://www.bloomberg.com/news/2010-12-07/teens-in-u-s-rank-25th-on-math-test-trail-in-science-reading.html>.

⁴ National Center for Education Statistics (2010). Special Analysis 2009. Retrieved April 2011, <http://nces.ed.gov/programs/coe/2009/analysis/>.

⁵ OES: <http://www.bls.gov/oes/>.

B. Washington State Demand

Although all careers require a foundation of mathematical knowledge, some are mathematics intensive. More students must pursue an educational path that will prepare them for lifelong work as mathematicians, statisticians, engineers, and scientists. National Council of Teachers of Mathematics

Washington State mirrors national demand for STEM degrees and Mathematics education. Demand in occupations requiring STEM degrees is grossly unmet in the state. This has resulted in employers recruiting external talent in large numbers. It is a critical for the state to focus on STEM education now as many of Washington's key economic sectors are buttressed by jobs requiring STEM.

Also, according to the 2010 Labor Market and Economic Analysis (LMEA) report for the state, jobs requiring a bachelor's degree or higher levels are projected to increase by 2018 at a faster rate than all other jobs. During the same period, there is projected decline in jobs requiring AA degrees.⁶ Occupations in the table below were extracted from a list of the "50 fastest growing occupations in the State of Washington." This information supports growth in mathematics intensive occupations as indicated by the "percent change" column.

Occupation	Employment		Percent	Top 50
	2008	2018	Change	Rank
Biomedical engineers	420	670	60%	1
Network systems and data communications analysts	11,880	16,180	36%	3
Market research analysts	9,710	12,320	27%	14
Computer and information scientists, research	1,750	2,130	22%	21
Computer software engineers, systems software	18,560	22,470	21%	27
Survey researchers	110	140	21%	29
Computer software engineers, applications	25,000	30,240	21%	30
Farm and home management advisors	630	750	20%	31
Computer programmers	11,500	13,730	19%	33
Network and computer systems administrators	11,930	14,140	19%	37
Materials scientists	190	220	17%	41
Mathematicians	60	70	16%	43
Civil engineers	14,330	16,630	16%	45
Physicists	500	580	15%	49

Table 2 Fastest Growing Occupations Requiring Mathematics Education

⁶ LMEA 2010:http://www.workforceexplorer.com/admin/uploadedPublications/10891_2010_Annual_Report, p. 40.

C. Regional and Community Demand

The state and region are currently experiencing economic recovery. King and Snohomish Counties have industries that will contribute to the recovery through production and employment. This includes technology, aerospace, engineering and development.

1. Snohomish County

The manufacturing sector is Snohomish County's largest, in terms of jobs, and is dominated by the aerospace products and parts manufacturing industry. Manufacturing is highly sensitive to conditions of the global economy. Snohomish County's manufacturing workforce contracted in 2008 and 2009. In 2010, demand for Boeing's commercial products increased. The company has ramped up production schedules and hiring over the past several months. In Snohomish County, manufacturing is responsible for the recovery of many jobs in 2010, and is anticipated to continue to fuel growth throughout 2011. The table below identifies occupations in Snohomish County that project strong growth. Again, these are occupations that require mathematics education.

Snohomish County	Employment Projections			
	2008	2018	Change	% Change
Biomedical Engineers	30	52	22	73.3
Computer Systems Analysts	590	620	30	5.1
Accountants and Auditors	1,838	2,059	221	12
Financial Analysts	298	328	30	10.1

Table 3 Employment Demand Data for Snohomish County

2. King County

King County is the largest business center in both the state of Washington and the Pacific Northwest with cutting-edge companies and a reputation for innovation. The county is home to some of the world's most successful businesses including Amazon.com, Boeing Commercial Airplanes, Costco, and Microsoft. King County is a leading global center for several emerging industries, including aerospace, biotechnology, clean technology, information technology, and international trade and logistics. These factors contributed to the County's ability to weather the economic downturn and are moving the County to economic recovery. The need for STEM education and graduates with STEM degrees is a clear mandate for King County.

King County	Employment Projections			
	2008	2018	Change	% Change

Biomedical Engineers	332	514	182	54.8
Mathematicians	18	20	2	11.1
Compensation, Benefits, and Job Analysis Spec	1,305	1,490	185	14.2
Statisticians	471	524	53	11.3
Computer Systems Analysts	10,298	11,471	1,173	11.4
Accountants and Auditors	13,655	15,464	1,809	13.2
Financial Analysts	2,021	2,343	322	15.9

Table 4 Employment Demand Data for King County

III. Support of the Statewide Strategic Master Plan for Higher Ed

2008 Strategic Master Plan for Higher Education in Washington Policy goal: Expand bachelor's and advanced degree programs in science, technology, engineering, mathematics, and health sciences.

The Higher Education Coordinating Board (HECB) outlines two primary goals in its strategic plan⁷:

Goal 1: We will create a high-quality higher education system that provides expanded opportunity for more Washingtonians to complete postsecondary degrees, certificates, and apprenticeships.

Goal 2: We will create a higher education system that drives greater economic prosperity, innovation and opportunity.

UW Bothell's charge is to provide educational opportunity and increase access for the region and community. We attempt to structure programs with the goal of incorporating flexibility and support for our students who are non-traditional or from underserved populations. The proposed mathematics degree program addresses regional demand for STEM degrees by educating graduates who will be prepared to enter high demand and growth fields in the State. It is deliberate in its structure to support transfer students and to encourage enrollment of underrepresented students. It will influence secondary education and pipeline institutions to strengthen and support preparation for the study of STEM curricula.

The proposed Mathematics degree program also promotes the core objectives in the HEC Board Strategic Master Plan:

Educational Attainment:

1. Focus on diversity. UW Bothell strives to bring a significant population of non-traditional students to technology fields, including underserved population and students with disabilities. Included in the

⁷ Washington State Higher Education Coordinating Board (HECB), 2008 Strategic Master Plan for Higher Education in Washington - Moving the Blue Arrow Pathways to Educational Opportunity. Olympia, 2007, p ii.

seven priorities of the UWB 21st Century Initiative is our commitment to diversity and inclusiveness.

Part of the Mission of the Mathematics degree program is to educate students to appreciate diversity; this effort will include efforts to recruit and retain a diverse faculty and student body.

2. Create higher expectations for K-12 students. The Mathematics program will serve as a gateway program for students wishing to pursue careers in K-12 education. A rigorous education in Mathematics will help these teachers to meet the HECB goal of creating higher expectations for K-12 students.
3. Create a system of support for lifelong learning. The program will be inclusive, striving to teach non-traditional as well as traditional college students. Support services will facilitate learning by non-traditional students returning to college to earn a degree.

Promote economic growth and innovation:

1. Fill unmet needs in high-demand fields. The need for graduates in Mathematics is supported by the data presented earlier. Additionally, UW Bothell is located in a technology corridor and is informed and encouraged by its regional partners to create programs that will provide industry-ready graduates.
2. Promote student enrollment in STEM fields. A Science and Technology Program was launched at UW Bothell in 2009; the Mathematics degree program will be housed in the new S&T unit. Classes developed for the Mathematics degree program will complement and support existing programs including engineering and biology and support the eventual development of additional STEM degree programs (for example chemistry, physics and other fields).
3. Expand research capacity: A focus of the Mathematics program will be to involve faculty and students in collaborative research. UW Bothell's Office of Research Support (ORS) already provides administrative support for research and will assist in identifying and connecting the program with relevant research opportunities.

IV. Relationship to Other Institutions

The review of regional and national programs included programs at branch campuses of larger state schools. Programs reviewed have numerous options for students at both the undergraduate and graduate level. While most of the degrees offered were BS degrees, some programs also offered BA versions of the major as well. This has the advantage of attracting a wider array of students, with varying backgrounds and interests.

A. *Regional Schools*

1. University of Washington Seattle

The University of Washington Seattle is home to several mathematics programs. The Department of Mathematics offers five degree programs designed to meet the needs of students interested in earning either a B.A. or B.S. in mathematics. The number of undergraduate mathematics majors continues to rise. The Newsletter of the Department of Mathematics states "at the end of the academic year (2010), there were 421 majors in the Mathematics undergraduate program and 265 majors in the joint ACMS (Applied and Computational Mathematics Sciences) program. Each of these numbers is a new record, and the total number of 686 betters the previous high by over 100." UW Seattle students may elect to earn either BS or BA in Mathematics by specializing in one of five options: 1) BS Comprehensive Option - for students who plan to do graduate study in mathematics, 2) BS Standard Option - for students who want a general background in mathematics, 3) BA Comprehensive Option - for students who are interested in a non-science degree in Mathematics, 4) BA Philosophy Option - for students preparing for entry into professional schools of business, law, and medicine, and 5) BA Teaching Preparation – for student preparing for teaching careers in secondary or middle schools. The majority of the Teaching Preparation majors go on to finish a Master's in Teaching. Other mathematical degree programs include ACMS, Statistics, and Computer Science and Engineering.

2. Washington State University

The Washington State University Department of Mathematics provides a curriculum suited to many different fields of study. The department administers undergraduate major and minor areas of concentration. Students may focus on a Bachelor of Science Degree with such options as: 1) Actuarial Sciences – provides a specialized education in mathematics and business for future employment in insurance and other financial security programs, 2) Computational Mathematics - provides the interface between models of physical, biological, economic, or engineering systems and the mathematical and statistical methods appropriate for their analysis, 3) Mathematical Modeling – provides training for jobs in mathematical modeling at academic institutions as well as in business and industry, such as manufacturing, marketing, aerospace, agriculture, and communications; in government and private laboratories, agencies and research centers, 4) Operations Research – provides education in applying advanced analytical methods to model a particular system for employment in industry, government, private consulting, and universities., 5) Theoretical Mathematics – provides a solid general undergraduate degree in mathematics for students wishing to pursue a graduate degree in mathematics, and 6) Secondary Mathematics Teaching – provides a sophisticated understanding of the mathematics that provides the foundation for teaching the secondary mathematics curriculum.

3. Western Washington University

The Department of Mathematics offers majors and minors in mathematics, applied mathematics and mathematics education. Combined majors are offered in mathematics and computer science, biology and mathematics, chemistry and mathematics, economics and mathematics, and physics and mathematics. More specifically, plans of study include: 1) B.A. Mathematics, 2) B.S. Mathematics, 3) B.S. Applied Mathematics, 4) B.A. Elementary Mathematics Education, 5) B.A. Secondary Mathematics Education, 6) B.S. Mathematics-Biology, 7) B.A. Mathematics-Chemistry (Secondary Education), 8) B.S. Mathematics-Computer Science, 9) B.A. Mathematics-Economics, and 10) B.A. Mathematics-Physics (Secondary Education). The majors mentioned above serve as components of a liberal education, but each one also prepares the recipient for a career in business, industry, government or education.

B. National Programs

1. Montana State University

The Montana State University Department of Mathematical Sciences has programs leading to the Bachelor of Science degree in four different areas: 1) Mathematics - prepares students for graduate work in mathematics, 2) Applied Mathematics - primarily designed to prepare graduates for employment in business, industry, and government, 3) Statistics - prepares students for employment in industry or for entry into a graduate program in statistics, and 4) Mathematics Teaching - prepare students to teach mathematics at the middle school or high school levels.

2. University of Wisconsin - La Crosse

The University of Wisconsin - La Crosse Mathematics Department serves a diverse group of liberal arts students by providing them with a solid foundation from which to study the natural and social sciences. They offer a single Mathematics Major, with several areas of emphasis to prepare students for careers in teaching, business, industry, government, and graduate study. More specifically, the areas of emphasis include: 1) Applied Emphasis, 2) Education Emphasis, 3) Emphasis in Statistics, 4) Concentration in Actuarial Sciences, and 5) Mathematics/Engineering Dual Degree Program.

V. Curriculum

The mathematics degree is primarily designed to prepare graduates for employment in business, industry, and mathematics teaching. Additionally, an appropriate choice of electives can ensure the student a solid preparation for graduate work in mathematics, mathematics education, or applied scientific computing.

A. Bachelor of Science in Mathematics

The proposed **Bachelor of Science in Mathematics** requires completion of 95 credits. The proposed curriculum is designed to meet the needs of students wishing to pursue a degree in the field of mathematics as well as streamline students both coming into the program (transferring from community college) and moving on beyond the program (e.g., Master of Education – M.Ed.). The Mathematics Basic Core Requirement may be completed at local community colleges (e.g., Cascadia, Edmonds, Shoreline, etc.) as demonstrated for Cascadia Community College on the list below. Additionally, the proposed curriculum will support the preparation of future mathematics teachers by streamlining students into the Master of Education in Teaching as well as the future mathematics endorsement. Additionally, the BS in Mathematics students will have completed all the required mathematics courses needed to be eligible for admission into the Master of Education in Teaching. Courses are distributed in four segments: basic core, advanced core, electives, and supporting science:

1. Mathematics Basic Core Requirement (35 credits)

B CUSP 124, 125, 126 <i>Calculus</i> (15)	(CC MATH 151,152, 153)*
STMATH 307 <i>Differential Equations</i> (5)	(CC MATH 238) **
STMATH 308 <i>Matrix Algebra</i> (5)	(CC MATH 208) **
STMATH 324 <i>Multivariable Calculus I</i> (5)	(CC MATH 264) ***
STMATH 341 <i>Introduction to Statistical Inference</i> (5)	(CC MATH 235) **

**Represents the course equivalencies for Cascadia Community College (CC).*

***Represents the course equivalencies for Cascadia Community College (CC) with Calculus II pre-requisite.*

****Represents the course equivalencies for Cascadia Community College (CC) with Calculus III pre-requisite.*

2. Mathematics Advanced Core Requirement (20 credits)

STMATH 300 *Foundations of Modern Mathematics* (5)
STMATH 381 *Discrete Mathematical Modeling* (5)
STMATH 402 *Abstract Algebra I* (5)
STMATH 424 *Introduction to Analysis I* (5)

3. Mathematics Electives (Choose 5 courses - 25 credits)

STMATH 310 *Mathematical Game Theory* (5)
STMATH 326 *Multivariable Calculus II* (5)
STMATH 350 *Applied Number Theory and Cryptography* (5)
STMATH 390 *Probability and Statistics in Engineering and Science* (5)

STMATH 403 *Abstract Algebra II* (5)

STMATH 420 *History of Mathematics* (5)

STMATH 425 *Introduction to Analysis II* (5)

STMATH 444 *Foundations of Geometry* (5)

STMATH 4X1/BEDUC 5X1 *Fostering Algebraic Reasoning* (5)

STMATH 4X2/BEDUC 5X2 *Fostering Geometric Reasoning* (5)

STMATH 4X3/BEDUC 5X3 *Fostering Data, Graphical & Statistical Understanding* (5)

4. Supporting Science Course Requirements (15 credits)

B PHYS 121 *Mechanics* (5); B PHYS 122 *Electromagnetism & Oscillatory Motion* (5)

CSS 161 *Fundamentals of Computing* (5)

The course sequence that supports mathematics education incorporates: STMATH 420, 444, STMATH 4X1/BEDUC 5X1, STMATH 4X2/BEDUC 5X2, and STMATH 4X3/BEDUC 5X3.

B. Description of Courses

Much of the curriculum listed above is already being offered to support the S&T Electrical Engineering major. The entire basic and advanced core curriculum is currently offered every year. Most of the newly proposed required and elective courses are accepted and well-defined sub-areas of mathematics so we will not describe them in detail. It is expected that electives will evolve with experience and curricular growth. The general guideline will be that electives require Calculus II as a prerequisite.

Additionally, the proposed course numbering reflects mathematics offerings at UW Seattle and course descriptions are in the UW General Catalog. Three courses, however, do not fall in this category:

- STMATH 4X1/BEDUC 5X1 *Fostering Algebraic Reasoning* (5)
- STMATH 4X2/BEDUC 5X2 *Fostering Geometric Reasoning* (5)
- STMATH 4X3/BEDUC 5X3 *Fostering Data, Graphical & Statistical Understanding* (5)

These courses are being developed and offered in collaboration with UW Bothell Education. The courses are designed to combine mathematics content and pedagogy that will directly apply to the student's future secondary mathematics classroom.

C. Student Pathways

B.S. DEGREE MATHEMATICS 2012-2016 Teaching and Mathematics Pathways

The following plan is just two EXAMPLES of how to schedule classes to graduate in 4 years. Other schedules may be equally valid. Transfer students from community colleges will follow the same pathway by transferring in the listed freshman and sophomore level courses.

	FRESHMAN 2012			SOPHOMORE 2013			JUNIOR 2014			SENIOR 2015		
	Fall	Winter	Spring	Fall	Winter	Spring	Fall	Winter	Spring	Fall	Winter	Spring
MATHEMATICS TEACHING PATHWAY	BCUSP 124 (5)	B CUSP 125 (5)	B CUSP 126 (5)	STMATH 307 (5)	STMATH 308 (5)	STMATH 300 (5)	STMATH 402 (5)	STMATH 381 (5)	STMATH 444 (5)	STMATH 424 (5)	STMATH 341 (5)	STMATH 420 (5)
				STMATH 324 (5)			STMATH 4X1/BEDUC5X1 (5)		STMATH 4X2/BEDUC5X2 (5)		STMATH 4X3/BEDUC5X3 (5)	
MATHEMATICS PATHWAY	BCUSP 124 (5)	B CUSP 125 (5)	B CUSP 126 (5)	STMATH 307 (5)	STMATH 308 (5)	STMATH 300 (5)	STMATH 402 (5)	STMATH 403 (5)	STMATH 326 (5)	STMATH 424 (5)	STMATH 425 (5)	STMATH 390 (5)
				STMATH 324 (5)		STMATH 420 (5)		STMATH 381 (5)			STMATH 341 (5)	

B CUSP 124, 125, 126 *Calculus I, II, and III* (15)

STMATH 300 *Foundations of Modern Mathematics* (5) [Prerequisite: B CUSP 125]

STMATH 307 *Differential Equations* (5) [Prerequisite: B CUSP 125]

STMATH 308 *Matrix Algebra* (5) [Prerequisite: B CUSP 125]

STMATH 310 *Mathematical Game Theory* (5) [Prerequisite: B CUSP 125]

STMATH 324 *Multivariable Calculus I* (5) [Prerequisite: B CUSP 126]

STMATH 326 *Multivariable Calculus II* (5) [Prerequisite: STMATH 324]

STMATH 341 *Introduction to Statistical Inference* (5) [Prerequisite: B CUSP 125]

STMATH 350 *Applied Number Theory and Cryptography* (5) [Prerequisite: B CUSP 124]

STMATH 381 *Discrete Mathematical Modeling* (5) [Prerequisite: STMATH 308]

STMATH 390 *Probability and Statistics in Engineering and Science* (5) [Prerequisite: B CUSP 126; may change to STMATH 341]

STMATH 402 *Abstract Algebra I* (5) [Prerequisite: STMATH 300 and STMATH 308]

STMATH 403 *Abstract Algebra II* (5) [Prerequisite: STMATH 402]

STMATH 420 *History of Mathematics* (5) [Prerequisite: B CUSP 125]

STMATH 424 *Introduction to Analysis I* (5) [Prerequisite: STMATH 300 and STMATH 324]

STMATH 425 *Introduction to Analysis II* (5) [Prerequisite: STMATH 424]

STMATH 444 *Foundations of Geometry* (5) [Prerequisite: B CUSP 126]

STMATH 4X1/BEDUC 5X1 *Fostering Algebraic Reasoning* (5) [Prerequisite: B CUSP 125]

STMATH 4X2/BEDUC 5X2 *Fostering Geometric Reasoning* (5) [Prerequisite: B CUSP 125]

STMATH 4X3/BEDUC 5X3 *Fostering Data, Graphical & Statistical Understanding* (5) [Prerequisite: B CUSP 125]

VI. Infrastructure Requirements

A. Facilities

Currently, UW Bothell courses in Mathematics use classrooms in UW1, UW2, and UWBB. Given the growth of UW Bothell, the classrooms are currently near capacity, and it is difficult to envision offering many new courses in the current space. A new building is to be built on the UW Bothell campus, which will house science

and mathematics teaching and research labs (among other functions envisioned for this building). It is anticipated that the new building will be available for occupancy in 2014.

B. Support Services

As other S&T programs are implemented in tandem with the Mathematics program, specific support services to meet the needs of science and technology will need to be developed. In any case, S&T students, including Mathematics majors, will place greater demands on the Quantitative Skills Center. It may also be helpful to establish peer-tutoring options for students in S&T.

1. Academic Transition Program

The University of Washington Bothell started the Academic Transition Program in September 2009; the objective of this bridge program is to help talented but under-prepared students of promise to make the transition to college-level coursework. The program runs four days per week from 9 am to 4 pm, providing intensive concentration in areas such as university culture and resources, study skills, writing and quantitative skills, as well as co-curricular activities. The program continues as a follow-up throughout the year. College credits are awarded to students for participation in the program.

2. Counseling Services

Confidential, short-term personal counseling is available to UW Bothell students free of charge. Students may utilize counseling for a wide range of personal concerns such as anxiety, depression, relationship difficulties, or adjustment issues. All services are offered in a safe and supportive environment.

3. Disabled Student Services

The University of Washington Disability Support Services office (DSS) is committed to ensuring that qualified students with documented disabilities are provided with an equal opportunity to participate in the variety of educational, recreational, and social opportunities available at the University. The primary functions of DSS are academic accommodations for students with a documented, permanent or temporary physical, mental, or sensory disability; resource and referral information; and advocacy support as necessary and appropriate. Academic accommodations for each student are determined on an individual basis with input from the diagnostician or physician (usually from the diagnostic report), the student and the Counselor or Director of the DSS office.

4. Library

UW Bothell Library is part of the University of Washington Library system, which provides access to over seven million volumes, over 50,000 serials, and hundreds of research databases. Reference services are available during regular library hours and 24/7 through online chat. One of the main features of the UW Bothell Library is an Information Commons, which offers 50+ computer workstations, providing access to the UW Libraries Catalog and online resources, the internet, and a limited suite of productivity software.

UW Bothell Mathematics students will have access to core databases and electronic resources, through the UW Libraries. The key electronic resources for research in mathematics are listed on the UW research guide <http://www.lib.washington.edu/subject/math>. As electronic database subscriptions increase and UW Bothell use of mathematics databases increases, UW Bothell will need to contribute a higher level of funding to continue receiving unlimited access to these major databases. It is also anticipated that tri-campus and consortial costs will increase over time, based on inflation, which tends to be high in the sciences. Additional funds will be needed to purchase books and media to support classroom instruction and student research needs in the area of mathematics, focusing on areas with little or no representation in the Bothell Library collection, including mathematics and mathematics education.

Highly prepared as well as underprepared students need Library and Librarian support to access, use, and critically evaluate essential mathematics resources and databases. Based on the current level of support given to UWB undergraduate students in related STEM fields, Mathematics students will need support from Librarians in terms of reference and resource questions (via email, Instant Message and in person) and some Librarian instruction (in person or through online instruction) on Library basics, key electronic and print resources, and specialized research skills. In alignment with the goals of the UWB Science and Technology program, student access to research librarians is necessary to foster student preparation, retention and achievement. We believe that we can best support mathematics students and faculty with the addition of a .25 FTE librarian beginning in the second year of the Programs.

5. Media Center

The Campus Media Center (CMC) provides a variety of services to UW Bothell students, faculty and staff. In addition to maintaining and circulating the local media collection, staff members also provide media research and procurement services. The CMC also assists in the development of media-related materials for instruction and provides training to faculty and students in the use of media and technology. Additional services include audio and video production as well as photographic and digital imaging production. The CMC also provides support to UW Bothell's highly technical classrooms. Each room is equipped with state-of-the-art instructional

technology including an electronic podium with an on-board instructor, computer and media playback devices. Finally, the CMC coordinates the distribution of cable television throughout the instructional areas of the campus.

6. Quantitative Skills Center

The Quantitative Skills Center is open to anyone who wants academic support with a quantitative question for one or more of their classes. The assistance offered by the QSC is for all students at any time; there is no requirement that a student be in a math class to receive help at the QSC. The QSC offers free tutoring for all UW Bothell students, staff, faculty, and alumni. As the Mathematics program grows it will be necessary for student support services, such as the QSC, to receive additional resources to be able to continue to provide high-quality support.

7. Writing Center

The UW Bothell Writing Center supports student writing in all academic programs by providing individual and group consultations (face-to-face and online), workshops, and classroom instruction. The WC will assist a student through the entire writing process. This includes organization, research, conducting reviews and the revision process.

8. Information Systems

The University of Washington Bothell provides a broad array of computing resources and services to all students, staff and faculty. Information Systems provides basic computing support to UW Bothell faculty, staff, and students. It maintains computer classroom and labs, provides technical assistance to faculty for both teaching and research, databases, educational technology efforts, and administrative access to information and maintains a robust, secure and stable networking environment providing e-mail, file storage, and back-up services.

VII. Faculty

A. Current Faculty

There are currently two tenure-track mathematicians/mathematics educators and two full-time lecturer positions in the Science and Technology (S&T). The mathematicians/mathematics educators and their areas of expertise are listed below.

- | | |
|-------------------------------|--|
| 1. Linda Simonsen (S&T) | Professor, Mathematics/Mathematics Education |
| 2. Peter Littig (S&T) | Assistant Professor, Mathematics |
| 3. Alex Barchachat (S&T/CUSP) | Lecturer, Mathematics |

4. Andrew Abian (S&T/CUSP) Lecturer, Mathematics

Additionally, there are tenure-track faculty members in other fields of study as well as part-time lecturers in S&T that have the considerable expertise to teach many of our lower level mathematics courses. The S&T tenure-track mathematicians/mathematics educators and a summary of their areas of expertise are listed below.

Linda Simonsen earned a B.S. in Mathematics from Augustana College in Sioux Falls, South Dakota. She obtained her MS in Mathematics from Montana State University, Bozeman and her Ph.D. in Mathematics Education from Oregon State University. She spent 13 years building her career in the Department of Mathematical Sciences at Montana State University. She also spent four years as an Associate Professor in the Mathematics Department at the University of Arizona before coming to UWB in 2010. Linda's research interests include making effective use of different modes of delivery to teach mathematics to diverse learners. In support of this objective, her research focuses on the nature and quality of mathematical discourse in on-line settings. This research stems from her extensive work developing online courses on the teaching of mathematics and statistics specifically designed to meet the needs of place-bound practicing mathematics and science teachers.

Dr. Simonsen teaches in S&T (and CUSP); she has considerable experience teaching a large variety of undergraduate and graduate mathematics courses; the courses range from Calculus to graduate courses in mathematics and mathematics education.

Peter Littig earned a B.A. in Mathematics from the University of California, Santa Barbara, a M.S. in Mathematics from the University of California, Davis and Ph.D in Mathematics from the University of Washington. Peter believes that good research can transform the lives of those involved in it. By asking meaningful questions, teachers and students create the possibility for innovative scholarship and genuine collaboration. Good research also invites its participants into a space of active learning and intellectual excitement. As a scholar, he is committed to engaging in research that links theory to experience, that illuminates the connections between disciplines, and that sustains the intellectual curiosity of his academic community. Peter's research interests are in algebraic topology, Lie theory, the historical development of mathematical thought, and the sociology of mathematics.

Dr. Littig teaches in S&T (and CUSP). Courses taught include: BIS 315 Understanding Statistics, BIS 329 Issues in Mathematics Across the Curriculum: Cryptography: Its History & Theory, Topology, Introduction to Mathematics Reasoning, Advanced Multivariable Calculus, Linear Algebra.

Alexandre Barchechat received his Ph.D. in mathematics from UC Davis in California. He has taught a wide variety of classes ranging from College Algebra to graduate courses in 3-manifolds. His area of interest has changed from geometric topology, in particular triangulations of three-manifolds, to math education.

Andrew Abian received his MS in physics from the University of Washington, and BS in mathematics with a minor in physics from the University of Iowa. He has also studied French at the Sorbonne in Paris, and statistics at Columbia University in New York. Prior to teaching at UW Bothell, he taught both math and physics courses at a wide range of community colleges in the Seattle area, as well as in Austin, Texas. He has also worked as an actuarial analyst, and software developer. Andrew currently teaches mathematics courses ranging from Pre-Algebra to Differential Equations, as well as Introductory Physics Labs at UW Bothell.

Additionally, there are currently three tenure-track mathematicians/mathematics educators on the UWB faculty outside of S&T; two are in the Education (ED) Program, and one is in the Interdisciplinary Arts & Sciences (IAS) Program. There are also several lecturers/senior lecturers/principal lecturers outside of S&T that have the considerable expertise to teach both lower level and upper level mathematics courses. The tenure-track mathematicians/mathematics educators and a summary of their areas of expertise are listed below.

Cinnamon Hillyard earned a B.S. in Mathematics and a Ph.D. in Mathematics both from Utah State University. Cinnamon's primary research area is undergraduate mathematics and statistics education especially the new realm of Quantitative Literacy (QL). She has studied connections between QL and other literacies, investigated ways to extend models of QL to the upper division college curriculum, analyzed math autobiographies for patterns in how students see and learn mathematics, and worked on issues surrounding assessment of QL. She is also interested in the cultural and disciplinary contexts of QL. In addition, she works on mathematical problems in the area of numerical methods for hyperbolic conservation laws with stiff source terms. These models can be used to represent a set of problems in gas dynamics, fluid flow, and combustions including the flow of pollutants, avalanche movement, and even traffic conditions.

Dr. Hillyard teaches in IAS; courses taught at UWB include Functions, Models, and Quantitative Reasoning, Interdisciplinary Inquiry, Topics in Mathematics Across the Curriculum: Symmetry, and Statistics for Policy Studies.

Robin Angotti earned a B.S. and M.A. in Mathematics from East Carolina University and a Ph.D. in Mathematics Education (Minor in Statistics) from North Carolina State University. Dr. Angotti's current

research includes: investigating students' mathematical understandings in technological contexts; statistics education; teaching algebra from a functional perspective using multiple representations; and developing students' conceptual understandings of mathematics and preparing teachers to teach in ways that promote and support the development of conceptual understanding.

Dr. Angotti teaches in Education. Courses taught include: BEDUC 419 Knowing, Teaching, and Assessing in Mathematics, BEDUC 425 Reflections on Professional Practice Seminar, BEDUC 491 Special Topics: History of Math, BEDUC 566 Education & Technology, BEDUC 559 & 560 Curriculum, Instruction, and Assessment in Secondary Science and Mathematics I and II, and BEDUC 556 Adolescent Development.

Allison Hintz earned a B.A. in K-8 Education from Washington State University, and both a M.Ed. and Ph.D. in Curriculum and Instruction (Mathematics Education) from the University of Washington. Dr. Hintz's academic interests are in the areas of student learning, elementary mathematics, classroom discourse, and teacher development. Her current research focuses on the mathematical and interactional demands students experience during discussion with care for supporting all children through mathematically productive and socially supportive discourse.

Dr. Hintz teaches in Education. Courses taught include K-8 mathematics methods for the Teacher Certification Program and the M.Ed. program.

B. New Faculty

To launch the new Mathematics major, we plan to hire two new full-time faculty members within the next three years. The hires will be in the areas of (1) Mathematics (to teach upper level courses in mathematics), (2) Mathematics/Mathematics Education (to teach upper level courses in mathematics as well as mathematics education).

In addition to courses in their areas of expertise, we anticipate that these hires will contribute to the Mathematics program by

- (1) supervising undergraduate research,
- (2) as the University of Washington Bothell grows, and as the Mathematics program grows, by participating in the teaching of introductory mathematics courses (for example, teaching calculus).

The following will apply to the recruitment and hiring of new faculty members in the Mathematics degree program:

1. We will hire new faculty members in the Mathematics Program through national searches, by advertising in appropriate professional journals. We will advertise in *Science* and *The Chronicle of Higher Education*. Other journals may be appropriate for specific sub-areas of Mathematics.
2. We will strive for faculty expertise in various areas of Mathematics, placing priority on the hiring of excellent educators and scholars with expertise in their sub-discipline, with the goal of providing outstanding educational and research experiences for students across the breadth of mathematical sub-disciplines. In hiring faculty, we will also seek candidates whose teaching will fit with the interdisciplinary nature of a UW Bothell education.
3. We will solicit applications from candidates from historically under-represented groups in the sciences by routinely contacting historically black colleges and universities and tribal colleges to publicize our searches. We will also post job ads on the web sites for MAA, AMS, and NCTM and other appropriate web sites.
4. The mission of the Office of the Associate Vice Provost for Faculty Advancement (working in UW's Office of Minority Affairs and Diversity [OMA&D]) is to ensure that UW recruits, promotes and retains an excellent and diverse faculty. We will work with OMA&D to attract a pool of applicants that includes women and members of under-represented groups.
5. Program materials and web photos will reflect and promote the diversity of the program.

VIII. Program Administration

The Mathematics degree program will be housed in the Science and Technology Program at UW Bothell. (Programs at UW Bothell are similar to Departments at UW Seattle.)

Administrative Structure

The Director of the Science and Technology Program (S&T) will appoint a Mathematics Degree Coordinator. The Mathematics Degree Coordinator will work with the Director of S&T to oversee Mathematics course offerings (including all courses required for the Mathematics degree) – to determine both which courses will be offered and the frequency of offerings. The Mathematics Degree Coordinator, in consultation with the Director of S&T, will appoint two Mathematics Committees: 1) Curriculum and Assessment, and 2) Admissions. The Degree Coordinator will be responsible for overseeing committees, and making recommendations to S&T about the curriculum, staffing, admissions, and assessment. While staffing these committees is the responsibility of the Science and Technology faculty, mathematics faculty from other UWB programs will be invited to participate to the extent feasible and appropriate.

(Note: at the launch of the degree program, there will be a single Mathematics Program Committee to take on both tasks; this will help the mathematicians and mathematics educators across campus to establish standards and procedures. As the number of faculty members teaching in Mathematics grows, we will create different committees, as needed.)

Committees

The Mathematics Curriculum and Assessment Committee will review curricular materials and information obtained through the Assessment process to evaluate the curriculum, and recommend any changes. The committee will also evaluate courses as possible Mathematics electives for other programs on campus (either adding or deleting courses). Additionally, the committee will gather information as specified in Section X: Assessment and will recommend changes in curriculum, sequencing of courses, teaching practices, or staffing. The focus of the assessment portion will be on achieving Mathematics Learning Objectives and effective learning on the part of students.

The Mathematics Admissions Committee will determine standards for admission to the Mathematics major, and will review applications to the major.

Support Staff

The S&T Program currently has a Program Administrator (Christine Howard) and an adviser (Sharon Meriwether), who serve all degree programs within S&T.

IX. Students

A. Student Population and Projected Enrollments

We expect the student population pursuing a degree in mathematics to be split evenly between those who wish to pursue a career in secondary mathematics teaching and those who wish to work in industry in a STEM field. Some students may also pursue a degree with desire to seek an advanced mathematics degree. Many students will already be taking several of the mathematics courses required for this degree because they are pursuing mathematics intensive degrees such as electrical engineering. We anticipate that some of these students will choose to double major. The table below shows projected enrollments and graduates through 2019, at which time we anticipate enrollment to level off.

Projected Enrollments and Graduates								
	2012	2013	2014	2015	2016	2017	2018	2019
Total Majors	5	10-15	15-20	20-30	30-50	50-75	75-100	100-125
Total Graduates				5-10	10-20	20-30	30-40	40-50

B. Diversity Plan

The 1990s saw significant decreases in both the number of engineering majors and the number of mathematics majors. Both numbers have since recovered, but to only just above the level of 1990... Disturbingly, the recent recoveries in both disciplines are powered almost entirely by white males and non-U.S. residents. Women as well as African, Hispanic, and Native Americans are decreasing as a share of these majors. If we want to build a talented American workforce for the future, we cannot afford to ignore these students.

- David Bressoud, President, Mathematical Association of America, 2009-10

The proposed Mathematics degree program is committed to building, nurturing, and sustaining a diverse student population, in accordance with the principles articulated by the University of Washington at large and UW Bothell in particular. UW Bothell's growing appeal is due, in part, to the individualized attention that the university provides its students. We are committed to recruiting and retaining diverse student, faculty, and staff populations to create a rich and multifaceted educational environment. In light of this commitment, the following program initiatives will be adopted:

- Recruitment: The program will establish, in consultation with local and national experts, a set of assertive recruitment practices designed to attract and support a diverse body of students to the program
- The program will be planned and courses will be scheduled to provide flexibility to meet the demands of nontraditional students.
- The Mathematics Assessment Committee (see Section X below) will conduct a formal evaluation of program diversity objectives. These objectives will be reviewed and updated at regular intervals to keep them in alignment with recognized, evidence-based best practices.
- Student organizations: The program will encourage and support the formation of student-led organizations.
- Seminar series: Students will be encouraged to attend and participate in the seminar series.
- Summer institutes/camps will build upon existing programs at UW Bothell & UW Seattle:
 - Multidisciplinary International Research Training (MIRT)

- Research Experience for Undergraduates (REU)
- Dream Project
- Student Recruitment and Admissions fairs
- Research Forums
- Centers: Plan programs & special events with existing Centers at UWB & UWS

X. Assessment Plan

A. Program Assessment

Upon approval of the mathematics degree program, the Science and Technology Program will appoint a Mathematics Assessment Committee to establish and formalize assessment procedures, collect data relevant to program assessment, evaluate the effectiveness of the program, and recommend changes in the curriculum or further refine assessment procedures.

The University of Washington mandates reviews of all academic units, including undergraduate degree programs, at least every ten years; these reviews are conducted jointly by the Dean of the Graduate School and the Dean of Undergraduate Academic Affairs.

- See <http://www.grad.washington.edu/fac-staff/programreviews/existing.shtml> for details.

Our overall assessment practices will be based on:

- The use of multiple measures of assessment.
- Formative evaluation.
- Data collected for the continuous revision and improvement of the degree program.

B. Student Assessment

To measure the effectiveness of the degree program in meeting its Learning Objectives, the Mathematics Assessment Committee will collect data related to the following:

- *Student evaluations* of each course. Evaluation forms will provide students the opportunity to directly assess course learning outcomes as well as those program learning objectives addressed in the course. Course evaluations also allow students to comment on the relevance of course content and the role of the course within the degree program.
- *Peer monitoring* of instruction, through classroom visits, allowing faculty members to better understand both what other courses cover, and the teaching styles used by other instructors.

- *Course-embedded assessment*, including student performance on exams and projects (e.g., papers, presentations, etc.), as well as overall course grades.
- *Student focus groups and exit interviews*.
- *Success of student-faculty research*, as measured by:
 - The number of presentations at conferences
 - The number of student co-authored publications.
- *Rates of student retention* within the program, to evaluate (among other things) student preparation for the program, admission requirements, and the effectiveness of student support services.
- *Tracking of program alumni* in terms of:
 - The number of students admitted to Master's in Teaching programs.
 - Surveys sent to alumni 3-5 years after graduation, to monitor:
 - The number of students employed in Mathematics-related fields.
 - Their perceptions of how well the program prepared them for work in Mathematics.
 - The number of students admitted to Ph.D. programs.
- *Program evaluation by an outside faculty evaluation group*.

The Mathematics Assessment Committee will analyze the collected data, and use it to evaluate the overall effectiveness and success of the program, and to recommend changes in program instructional practices, content, curriculum or other applicable areas. The following table summarizes our anticipated program assessment plan.

Item	Assessment	Method	Frequency
Curriculum	<ul style="list-style-type: none"> Program coherence Appropriateness of learning outcomes 	a. Student surveys (focus groups, exit interviews) b. Alumni surveys c. Course-embedded assessment	Annually
Students	Student learning outcomes	a. Student surveys (course evaluations, focus groups, exit interviews) b. Course-embedded assessment c. Alumni surveys	Quarterly course evaluations, Annual student surveys
Enrollment	<ul style="list-style-type: none"> Enrollment and retention trends Diversity of students 	a. Data from Office of Institutional Research, UWB Admissions b. Recruitment goals	Annually
Faculty	Faculty activity in: <ul style="list-style-type: none"> Research Teaching improvement Professional organizations College governance: adequate staffing, tenure, promotions 	a. Faculty self-evaluations b. Personnel committee	Annually
Resources	<ul style="list-style-type: none"> Adequate facilities Sufficient equipment Appropriate technology Adequate program budget 	a. Faculty self-evaluation budget/operations committee b. Student surveys (focus groups, research success) c. Alumni success, Alumni surveys	Annually
Student Services	Adequacy of support from: <ul style="list-style-type: none"> Recruitment Admissions Advising Counseling Retention 	a. Data from Office of Institutional Research, UWB Admissions (data on admissions, retention) b. Student surveys	Annually
Academic Support	Adequacy of support from: <ul style="list-style-type: none"> Quantitative Skills Center Writing Center Library Information Technology Advising 	a. Student surveys b. Course-embedded assessment c. Student retention data d. Advising report data	Annually

XI. Budget

DRAFT Budget for Mathematics		2012-2013	2013-2014	2014-2015	2015-2016	2016-2017
Program Expenses*		YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5
Admin Faculty Salaries (.2 FTE) Benefits @27.2 %		28,162.00	29,007.00	29,877.00	30,773.00	31,696.00
Faculty Salaries (1.65 FTE); Benefits @27.2%		187,201.00	192,817.03	198,601.54	204,559.59	210,696.37
Admin Staff (.15 FTE) Benefits @33.6%		13,027.00	13,418.00	13,820.00	14,235.00	14,662.00
Advising Salaries (.15 FTE) Benefits @33.6%		10,020.00	10,321.00	10,630.00	10,949.00	11,278.00
Library Salaries (.25 FTE) Benefits @ 33.6%		18,700.00	19,635.00	20,617.00	21,648.00	22,731.00
Financial Aid specific to the program		-	-	-	-	-
Contract Services		-	-	-	-	-
Goods and Services		-	-	-	-	-
Travel		3,000.00	3,000.00	3,000.00	3,000.00	3,000.00
Equipment		10,000.00	10,000.00	10,000.00	20,000.00	20,000.00
Lease or Acquisition (attach form iii.a)		-	-	-	-	-
Other (itemize)		-	-	-	-	-
Library Materials & Resources		10,000.00	5,000.00	4,000.00	4,000.00	4,000.00
Facilities renovation ^b		-	-	-	-	-
Replacement/maintenance costs		1,000.00	1,000.00	1,000.00	1,000.00	1,000.00
Faculty Search & Startup Costs		-	50,000.00	-	-	-
Indirect (if applied to the program)		-	-	-	-	-
Total Costs		281,110.00	334,198.03	291,545.54	310,164.59	319,063.37
Program Revenues		YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5
FTE Enrollment						
General Fund: State Support**		82,500	109,725	145,934	194,093	258,143
Tuition and Fees (total)*		174,422	231,981	308,534	410,350	545,766
Corporate Grants / Donations		-	-	-	-	-
Internal Reallocation		-	-	-	-	-
Other Fund Source - S & T Program		-	-	-	-	-
Total Revenue		256,922	341,706	454,468	604,443	803,909

Bothell: Bachelor of Science degree in Mathematics (BST-20120711)

uwcr
uwcr
Board owner

Posted Sep 25, 2012 10:05 AM

Please review the attached 1503 pdf requesting to establish a Bachelor of Science degree in Mathematics at the Bothell campus and post comments by 5:00 pm on Tuesday, October 16th.

If you have any problems viewing the attachment or need disability accommodations, please contact the University Curriculum Office at uwcr@uw.edu.

Attachments:



BST-20120711.pdf 70.8MB Download View

jpalmier
JOHN PALMIERI

For reference: UW Seattle's math major programs and in particular the B.S. in mathematics – standard option (PDF), which might be the appropriate comparison to Bothell's proposed B.S. in mathematics.

The breadth of the courses for Bothell's major looks good. However, it looks like Bothell's major has fewer requirements than Seattle's: 16 one-quarter math courses at Bothell compared to 20 at Seattle. Most (all?) of Bothell's math courses are listed as 5 credits, while most of Seattle's are 3 credits. I don't know if this is important: how does the 5-credit Math 402 (Bothell) compare to the 3-credit Math 402 (Seattle), for example?

Seattle offers several 400-level 3-quarter sequences, but I don't see any of these at Bothell. I am somewhat concerned that students won't explore core topics like abstract algebra or real analysis in greater depth through standard course work.

linda
LINDA T. BOYLE

Sorry to be naive, but is there anyway to make the Seattle and Bothell programs more similar (in terms of classes, course descriptions, as well as credit hours). Thinking of the future, if we do such a thing, we can have students consider (as an option) classes across both campuses, rather than look to community colleges for some of the requirements - just a thought.

barcheca
ALEXANDRE
BARCHECHAT

The one thing that is still unclear to me are the differences in credits (3 vs. 5) with Seattle. How will students from one campus be able to transfer their credits to the other one?

jvburke
JAMES V. BURKE

I applaud this group of seven faculty in their endeavor to provide an undergraduate BS math degree. This is an ambitious for such a small group. But on reading the document I do have some concerns which I list below.

1) A BS degree in Math often signifies that these majors have the preparation necessary to begin graduate work in math. All of the math graduate programs I am aware of assume that such students have demonstrated proficiency in two or more areas of math at the senior level. These areas include algebra, real analysis, complex analysis, combinatorics, probability, geometry, The program as described only lists one area, algebra, so I do not see how a student in this major can pursue graduate work in math without further preparation. One of the goals of this proposal should be to develop the expertise and student interest in at least one other area of advanced mathematics beyond abstract algebra.

2) Of the listed faculty, 4 are in Math Ed, 1 is an instructor for freshman and sophomore courses, and 2 have a classical mathematical training that would allow them to teach any senior level math course. Clearly, there is a deficiency in faculty with broad mathematical training at the graduate level for a successful BS degree. But curiously the proposal supports the goal of further hiring in math education. In principle, I see no problem in further hires in Math Ed, but certainly not to support this BS degree. The most important hiring goal for a BS in math should be to hire more classically trained mathematicians who can teach a full range of senior level math courses with deep understanding and passion.

3) It seems that the true strength of this group is Math Ed. Indeed, 4 of the 7 listed faculty have expertise in this area. So why not a BA degree in Math Ed? Or does such a degree already exist?

In short my concerns are 1) insufficient diversity in upper division math courses, 2) insufficient staffing with broad mathematical training at the graduate level, and 3) improperly aligned highering goals for the success of a math BS degree.

I suggest refocusing on the strengths of the majority of the listed faculty which is Math Ed.

tuncel

Posted Oct 16, 2012 9:31 AM

I have discussed the UWB proposal for a BS degree in mathematics with a number of colleagues, including our department's Executive Committee. We are supportive of UWB developing mathematics courses and programs to serve its students. We have a number of observations related to the proposed program; I will summarize them below.

Our BS degree in Math serves students who plan to enter graduate school or careers in the STEM fields. Our BA degree is less demanding, in terms of both depth and breadth, at least as far as the (minimum) requirements are concerned. (Our full range of our courses is open to the BA students, and many BA students take the opportunity to go beyond the minimum requirements and attend a selection of courses that suit their goals.)

The requirements for the proposed UWB program are similar to those of our BA degree. In addition, the proposed program reflects the MAA recommendations for students preparing to teach secondary mathematics. We would suggest a BA in Math and/or a BA in Math with a Teacher Prep option as the degree goal of the proposed program.

Any degree in mathematics requires teaching a rather large number of specialized courses; in our case these courses are typically taught by research mathematicians. The range of courses proposed for the UWB degree is appropriate for a BA degree. However, these courses (especially those numbered 325 and above) will still add up to a significant amount of faculty effort. It is important for the UW and the UWB to think carefully about the following questions: What kind of student do we want the program to attract, what are the likely career goals of these students? And, accordingly, what kind of

faculty would we like to teach these courses? What is the total
FTE
that would be required to offer the proposed set of courses?
How
long would it take to have the faculty and the courses in place?

On the Seattle campus, Math courses numbered above 325
operate with
full enrollment, even after having restricted enrollment to
students
in the Math, ACMS and Stat degree programs. Any additional
enrollment coming the way of these courses would need to be
met by
opening additional sections and would require the
corresponding
investment of resources.

Jennifer A. Payne

From: Selim Tuncel <chair@math.washington.edu>
Sent: Wednesday, October 24, 2012 2:32 PM
To: Jennifer A. Payne
Subject: RE: UWB mathematics degree proposal (fwd)

Dear Jennifer,

I thought I would pass on an email exchange that followed the comments I posted on the catalyst comment site for the proposed UWB Math degree. The emails are appended in reverse order below.

Best,

Selim Tuncel

----- Forwarded message -----

Date: Tue, 16 Oct 2012 18:01:17 -0700 (PDT)
From: Selim Tuncel <chair@math.washington.edu>
To: Linda Simonsen <LSimonsen@uwb.edu>
Cc: "jeffords@u.washington.edu" <jeffords@u.washington.edu>,
"djwad@u.washington.edu" <djad@u.washington.edu>,
"bstacey@u.washington.edu" <bstacey@u.washington.edu>,
"wxs@u.washington.edu" <wxs@u.washington.edu>
Subject: RE: UWB mathematics degree proposal

Dear Linda,

I am very pleased to hear that you have approval to advertise for one or two positions at the associate/assistant professor level. Hiring strong research mathematicians to teach the upper division courses is going to be critical to the success of your degree. As you know, an electronic ad in the American Mathematical Society electronic site <http://www.ams.org/profession/employment-services/eims/eims-home> is the most effective way of reaching research mathematicians who are on the job market.

The AMS is quick to post the ad; it only takes a couple of days to get your ad on there.

For a BS degree curriculum comparable to ours, I would recommend the following.

1. Add 326, 403, 425 and 441 to the Advanced Core Requirements of your degree.
(In particular, two quarters of algebra 402/403 and two quarters of real analysis 424/425 will then be required).
2. Move 381 from Advanced Core Requirements category to Math Electives. (381 is quite labor intensive, and not as standard as the other core courses.)
3. Having moved 326, 403 and 425 from Mathematics Electives to the Mathematics Advanced Core Requirements category, you will want to add a few courses to the Mathematics Electives category: 461 (combinatorics) and 407 (discrete optimization) would both be extremely valuable to students interested in careers industry. In fact, all students would benefit from having access to these courses, and they are relatively straightforward to teach, so I would strongly recommend including them. 427/428 (complex analysis) would fill the only obvious remaining gap in the mathematical landscape. Frankly, I would go with 461 and 407 for now, and plan on adding 427/428 in a couple of years.

We advise students thinking of applying to grad school in mathematics to take the entire three-quarter sequences 402/403/404 and 424/425/426. You may want to add 404 and 426 to your electives in the future if you find you have sufficient demand from such students. (If, on the other hand, you find that you only have a small number of such students and they want to take 404 and/or 426 on the Seattle campus, that should be no problem.)

Please let me know if you would like to discuss any of this further. This is very exciting!

Best,

Selim

On Tue, 16 Oct 2012, Linda Simonsen wrote:

> Date: Tue, 16 Oct 2012 17:33:50 +0000
> From: Linda Simonsen <LSimonsen@uwb.edu>
> To: Selim Tuncel <chair@math.washington.edu>,
> "jeffords@u.washington.edu" <jeffords@u.washington.edu>,
> "djwad@u.washington.edu" <djwad@u.washington.edu>,
> "bstacey@u.washington.edu" <bstacey@u.washington.edu>,
> "wxs@u.washington.edu" <wxs@u.washington.edu>
> Subject: RE: UWB mathematics degree proposal
>
> Dear Selim,

Thank you for your comments regarding the UWB Mathematics degree. I look forward to visiting with you in more detail, but I would like to take a moment to briefly respond to your concerns:

First, I am happy to report that we have been given approval to advertise this fall for an Associate Professor of Mathematics and possibly an Assistant Professor as well. You will see the job ad shortly. In both case, it is critical that we hire research mathematicians with the ability to teach upper level courses in the mathematics degree. I am delighted with UWB's commitment to mathematics in granting these resources.

Yes, the degree reflects the MAA recommendations for students preparing to teach secondary mathematics. However, this degree must also prepare students for careers in the industry (Boeing, Google...) as well as or careers in the STEM fields. While I anticipate that most of our graduates will be focused on teaching secondary mathematics and obtaining careers in STEM fields, we also want our graduates to be able to enter mathematics graduate school if so desired (we have a few incredibly gifted mathematics students). We understand that they will be lacking extensive training in analysis and plan to advise them to potentially take these courses from UW Seattle. Thus, if in a few years we notice that our graduates tend to focus on mathematics graduate school we will need to add these courses to our curriculum or further discuss with you the notion of you "opening additional sections and ... the corresponding investment of resources."

It is the consensus of the UWB faculty working on this degree that we would like to offer a BS in Mathematics instead of a BA. Could you give me a recommendation of what additional coursework you would like to see offered if we commit to a BS?

Thank you again for your comments and support, Linda

From: Selim Tuncel [chair@math.washington.edu]
Sent: Tuesday, October 16, 2012 9:32 AM
To: Linda Simonsen; jeffords@u.washington.edu; djwad@u.washington.edu; bstacey@u.washington.edu; wxs@u.washington.edu
Subject: UWB mathematics degree proposal

Dear Linda, Susan, Doug, Bob and Werner,

I have appended below the comments I just posted on the Catalyst page for the tri-campus review of the UWB math degree. We would be pleased to work with our colleagues at UWB as they develop their mathematics courses and programs.

Please let me know, Linda, if you would like to chat about this.

Best,

Selim

I have discussed the UWB proposal for a BS degree in mathematics with a number of colleagues, including our department's Executive Committee. We are supportive of UWB developing mathematics courses and programs to serve its students. We have a number of observations related to the proposed program; I will summarize them below.

Our BS degree in Math serves students who plan to enter graduate school or careers in the STEM fields. Our BA degree is less demanding, in terms of both depth and breadth, at least as far as the (minimum) requirements are concerned. (Our full range of our courses is open to the BA students, and many BA students take the opportunity to go beyond the minimum requirements and attend a selection of courses that suit their goals.)

The requirements for the proposed UWB program are similar to those of our BA degree. In addition, the proposed program reflects the MAA recommendations for students preparing to teach secondary mathematics. We would suggest a BA in Math and/or a BA in Math with a Teacher Prep option as the degree goal of the proposed program.

Any degree in mathematics requires teaching a rather large number of specialized courses; in our case these courses are typically taught by research mathematicians. The range of courses proposed for the UWB degree is appropriate for a BA degree. However, these courses (especially those numbered 325 and above) will still add up to a significant amount of faculty effort. It is important for the UW and the UWB to think carefully about the following questions: What kind of student do we want the program to attract, what are the likely career goals of these students? And, accordingly, what kind of faculty would we like to teach these courses? What is the total FTE that would be required to offer the proposed set of courses? How long would it take to have the faculty and the courses in place?

On the Seattle campus, Math courses numbered above 325 operate with full enrollment, even after having restricted enrollment to students in the Math, ACMS and Stat degree programs. Any additional enrollment coming the way of these courses would need to be met by opening additional sections and would require the corresponding investment of resources.

NOV 9 2012

W UNIVERSITY of WASHINGTON | BOTHELL

Office of the General Faculty Organization

To: Faculty Council on Tri-Campus Policy

From: Kari Lerum, ^{KL}Chair, Executive Council of the General Faculty Organization, University of Washington Bothell

Date: November 6, 2012

Re: Executive Council Approval of BS in Mathematics

The Executive Council (EC) of the General Faculty Organization of University of Washington Bothell reviewed the responses from the tri-campus review of the proposal for the BS in Mathematics at its November 6, 2012 meeting. The EC has determined that the proposing faculty in the Science and Technology Program have duly considered and responded to the comments posted by faculty from across the three campuses during the tri-campus review period.

Please let me know if you need any additional information.

**Formal Response to the Tri-campus Undergraduate Curriculum Review
Process for New Programs: Bothell: Bachelor of Science degree in Mathematics
(BST-20120711)**

We are delighted with the positive feedback and helpful observations that were provided in the five comments posted on Catalyst. In general, the reviewers were very "supportive of UWB developing mathematics courses and programs to serve its students." In summary, there were three issues that necessitate a formal response:

1) *Insufficient staffing with broad mathematical training at the graduate level.*
(This concern was reiterated in two of the five comments.)

Response:

We are happy to report that this concern has been adequately addressed with the recent approval to advertise this fall for an Associate Professor of Mathematics and possibly an Assistant Professor as well. In both cases, it is critical that we hire research mathematicians with the ability to teach upper level courses in the mathematics degree. We are delighted with UWB's commitment to mathematics in granting these resources.

2) *Debate whether the UWB Mathematics degree should be a B.S. or a B.A.* (This issue was discussed in two of the five comments. One comment stated "the (UWS) B.S in Mathematics – Standard Option... might be the appropriate comparison to Bothell's proposed B.S. in mathematics." However, this reviewer had questions regarding the course numbering and credits stating "it looks like Bothell's major has fewer requirements than Seattle's: 16 one-quarter math courses at Bothell compared to 20 at Seattle. Most (all?) of Bothell's math courses are listed as 5 credits, while most of Seattle's are 3 credits. I don't know if this is important: how does the 5-credit Math 402 (Bothell) compare to the 3-credit Math 402 (Seattle), for example?" A second comment stated "the requirements for the proposed UWB program are similar to those of our (UW Seattle) BA degree. In addition, the proposed program reflects the MAA recommendations for students preparing to teach secondary mathematics. We would suggest a BA in Math..."

Response:

We believe that while our use of similar course numbering to UWS mathematics helps in understanding the overall thread of the curriculum, it may have caused some confusion as to the depth of the course/sequence content. For example, the UWS MATH 402/403 sequence is 6 credits, while the UWB STMATH 402/403 sequence is 10 credits. Thus, the depth of content in these courses will be more equivalent to a UWS full year sequence. Additionally, the UWS BS in Mathematics – Standard Option requires a total of 51 credits of upper level mathematics with 6 credits in each of Advanced Multivariable Calculus, Real Analysis, and Modern Algebra. The UWB degree requires a total of 65 credits in upper level mathematics with 5 credits in each of Advanced Multivariable Calculus, Real Analysis, and Modern Algebra. We believe that the solid mathematics requirement in the UWB

degree represents a BS in mathematics. Furthermore, the proposed UWB coursework is much more mathematics specific than the broad nature of the UWS BA in Mathematics – Standard Option. This degree requires only 3 credits in Advanced Multivariable Calculus and no requirement of Real Analysis or Modern Algebra.

The UWB mathematics degree was designed to reflect the MAA recommendations for students preparing to teach secondary mathematics. However, this degree must also prepare students for careers in the industry (Boeing, Google...) as well as or careers in the STEM fields. Hence, you will notice that the proposed UWB mathematics degree far exceeds the mathematical requirements of the UWS B.A. in Mathematics – Teacher Preparation Option since this UWS option requires a total of 44 credits in upper level mathematics with no specific requirement of Advanced Multivariable Calculus, Real Analysis, and Modern Algebra.

3) *Insufficient diversity in upper division math courses* (This issue was discussed in two of the five comments. While one reviewer suggested that “the breadth of the courses for Bothell's major looks good” another reviewer was concerned that “any additional enrollment (to UW Seattle mathematics courses) coming the way of these courses would need to be met by opening additional sections and would require the corresponding investment of resources.”

Response:

As we hire new faculty members we will increase the number and diversity of our upper-level mathematics courses based on their areas of expertise and interest of the new faculty member(s). Furthermore, we will carefully consider the reviewers recommendation to “add a few courses to the Mathematics Electives category: 461 (Combinatorics) and 407 (Discrete Optimization) that would both be extremely valuable to students interested in careers industry.”

While we anticipate that most of our graduates will be focused on teaching secondary mathematics and obtaining careers in STEM fields, we also want our graduates to be able to enter mathematics graduate school if so desired (we have a few incredibly gifted mathematics students). We understand that they will be lacking extensive training in analysis and plan to advise them to potentially take these courses from UW Seattle. If, in a few years, we notice that our graduates tend to focus on preparing for mathematics graduate school we will need to add these courses to our curriculum or further discuss with UW Seattle the notion of them “opening additional sections and the corresponding investment of resources.” We have discussed this issue directly with Selim Tuncel (Chair, Department of Mathematics, UWS) and he responded positively with “if you find that you only have a small number of such students and they want to take 404 and/or 426 on the Seattle campus, that should be no problem.”

UNIVERSITY CAMPUSES UNDERGRADUATE PROGRAM REVIEW PROCEDURES**

CHECKLIST

Title of Proposal: Bachelor of Science degree in Mathematics

Proposed by (unit name): Science and Technology

Originating Campus:

☐ UW, Seattle

☒ UW, Bothell

☐ UW, Tacoma

I. Phase I. Developed Proposal Review (to be completed by Originating Campus' Academic Program Review body)

A. Review Completed by: (list name of program review body)

Chaired by:

07/12/12 Date proposal received by originating campus's review body

07/27/12 Date proposal sent to University Registrar

10/25/12 Date proposal posted & email sent to standard notification list

11/06/12 Date of originating campus's curriculum body approval

(Note: this date must be 15 business days or more following date of posting)

B. 5 Number of comments received. Attach the comments and a summary of the consideration and responses thereof : (1-2 paragraphs)

II. Phase II. Final Proposal Review (to be completed by FCTCP)

A. Review Completed by:

☒ FCTCP subcommittee

☐ FCTCP full council

Chaired by: William Erdly

11/18/12 Date request for review received from University Registrar

01/22/13 Date of FCTCP report

B. Review (attached)

YES NO

☒ ☐ Was notice of proposal posted on UW Website for 15 business days?

☒ ☐ Was notice of proposal sent to standard mailing list 15 business days in advance of academic program review?

☒ ☐ Were comments received by academic program review body?

☒ ☐ Was response to comments appropriate? (explain, if necessary)

☐ ☒ Was final proposal reviewed by FCTCP within 14 days of receipt?

☒ ☐ Was there adherence to the University Campuses Undergraduate Program Review Process? (explain, if necessary)

FCTCP delays due to holidays, availability of subcommittee members, and file size limits.

C. Recommendation

☒ Forward for final approval

☐ Forward to Provost because of University issues (Explain)

☐ Return to campus council because of insufficient review (Explain).

**Endorsed by Faculty Senate Executive Committee, 1/10/05, modified 1/31/06; These procedures apply to new undergraduate degrees, majors, minors (and certificates) and substantive changes to same