FAIRMONT STATE UNIVERSITY™

Office of the Provost
1201 Locust Avenue • Fairmont, West Virginia 26554
Phone: (304) 367-4101 • Fax: (304) 367-4902
www.fairmontstate.edu

MEMORANDUM

TO: Faculty Senate

FROM: Susan Ross

DATE: March 5, 2020

SUBJECT: Curriculum Proposal #19-20-17 Sci Tech/Computer Science and Math/Math Program

The purpose of this proposal is to make the following alterations to the B.S. in Mathematics and B.A. Education, Specialization in Mathematics Grades 5 – Adult program curricula

1. Remove "Mathematical Logic" (MATH 2510) as a required course for these majors and allow a Group A or Group B elective to take its place.
2. Place MATH 2510 in the list of Group B electives.
3. Allow COMP 1110 to serve the programming requirement for the mathematics major.
4. Introduce tiered special topics courses so that the course number better reflects the content of such courses.
5. Add the new courses to the "Group B" electives.

cc: Richard Harvey
Cheri Gonzalez
Laura Ransom
Lori Schoonmaker
Tom Cuchta

CURRICULUM PROPOSAL (Submit one hard copy and an electronic copy to the Associate Provost by the second Tuesday of the month.)

Proposal Number: #19-20-17

School/Department/Program: SciTech/Computer Science and Math/Math Program

Preparer/Contact Person: Dr. Tom Cuchta

Telephone Extension: 4218

Date Originally Submitted:

Revision (Indicate date and label it Revision #1, #2, etc.): #0 **Revison 1**

Implementation Date Requested: Fall 2020

I. **PROPOSAL**. Write a brief abstract, not exceeding 100 words, which describes the overall content of the proposal.

The purpose of this proposal is to make the following alterations to the *B.S. in Mathematics* and *B.A. Education, Specialization in Mathematics Grades 5-Adult* program curricula

1. **Remove "Mathematical Logic" (MATH 2510) as a required course for these majors and allow a Group A or Group B elective to take its place.**
2. **Place MATH 2510 in the list of Group B electives.**
3. **Allow COMP 1110 to serve the programming requirement for the mathematics major.**
4. **Introduce tiered special topics courses so that the course number better reflects the content of such courses.**
5. **Add the new courses to the "Group B" electives.**

II. **DESCRIPTION OF THE PROPOSAL**. Provide a response for each letter, A-H, and for each Roman Numeral II–V. If any section does not apply to your proposal, reply N/A.

A. Deletion of course(s) or credit(s) from program(s)
No courses are deleted by this proposal.

Total hours deleted. 0

B. Addition of course(s) or credit(s) from program(s)
Special Topics courses MATH 2299, MATH 3399, and MATH 4499 are added by this proposal, but they are not added to any program.

Total hours added. 0

C. Provision for interchangeable use of course(s) with program(s)
N/A

D. Revision of course content. Include, as an appendix, a revised course description, written in complete sentences, suitable for use in the university catalog.
N/A

E. Other changes to existing courses such as changes to title, course number, and elective or required status.
For both the *B.S. Mathematics* and *B.A. Education, Specialization in Mathematics Grades 5-Adult*:
1. **MATH 2510 should be removed as a required course for the *Mathematics* and *Specialization in Mathematics Grades 5-Adult* majors and changed to a Group B elective for those majors.**
2. **"COMP 1110 or COMP 1120" should be listed as a required course for both majors. Currently only COMP 1120 is required.**
3. **The newly created courses MATH 2299, MATH 3399, and MATH 4499 should be listed a Group B electives.**

F. Creation of new course(s). For each new course

1. Designate the course number, title, units of credit, prerequisites (if any), ownership (FSU or shared) and specify its status as an elective or required course. If you are creating a shared course, attach a memo from the Deans of the affected Schools explaining the rationale for the course being shared.
   a. **MATH 2299 – Special Topics in Mathematics – 1-12 hours – prerequisites determined on a per-course basis – FSU ownership – elective course**
   b. **MATH 3399 – Special Topics in Mathematics – 1-12 hours – prerequisites determined on a per-course basis – FSU ownership – elective course**
   c. **MATH 4499 – Special Topics in Mathematics – 1-12 hours – prerequisites determined on a per-course basis – FSU ownership – elective course**

2. Include, as an appendix, a course description, written in complete sentences, suitable for use in the college catalog.
See Appendix B below.

3. Include, as an appendix, a detailed course outline consisting of at least two levels.
N/A – being special topics courses, outlines must be provided for each instance of the course

4. In order to meet the requirements as outlined in Goal One of the Strategic Plan, please include Outcome Competencies and Methods of Assessment as an appendix. Examples are available upon request from the Chair of the Curriculum Committee.
N/A – outcomes and assessments must be defined on a per course basis

G. Attach an itemized summary of the present program(s) affected, if any, and of the proposed change(s).

Describe how this proposal affects the hours needed to complete this program. Specifically, what is the net gain or loss in hours? Use the format for Current and Proposed Programs in Appendix A.
No effect to the net hours of the program. The removal of a 3-hour required course is replaced with a 3 hour elective, and allowing the choice of a different programming course also does not affect the hours.

III. **RATIONALE FOR THE PROPOSAL.**

A. **Quantitative Assessment**: Indicate the types of assessment data, i.e., surveys, interviews, capstone courses, projects, licensure exams, nationally-normed tests, locally developed measurements, accreditation reports, etc., that were collected and analyzed to determine that curricular changes were warranted. Quantitative data is preferred.
MATH 2510 (Mathematical logic) or an equivalent course is not a requirement for other mathematics programs in the state of West Virginia. It does not serve a clear purpose in our

curriculum. The necessary basic logic needed to do mathematical proofs is obtained in MATH 1561 (Introduction to Math Reasoning). Practice using that logic to write proofs occurs in MATH 2563. Consequently, MATH 2510 ends up being a course in "formal languages", which is an atypical requirement in most mathematics degrees.

Allowing COMP 1110 as the programming course is sensible. That course currently emphasizes the Python programming language, which is widely used in academia, business, government, and industry. COMP 1120 is a course required of computer science majors while COMP 1110 is often currently taken by engineering technology students to get practical hands-on knowledge of programming.

B. **Qualitative Assessment**: Based upon the assessment data above, indicate why a curricular change is justified. Indicate the expected results of the change. Be sure to include an estimate of the increased cost, or reduction in cost of implementation. FOR EXAMPLE: Will new faculty, facilities, equipment, or library materials be required?

In recent years, the math program has offered many special topics courses all confined to the course number MATH 1199. The level of these courses can vary, and we feel it is wise to create tiered special topics course numbers to emphasize the distinction between them. This will benefit students because their transcripts will have course numbers that better reflect the content of special topics courses.

We decided to add 2299, 3399, and 4499 to the Group B electives to prevent having to manually ask the registrar to allow them to count as electives. We are leaving 1199 not in Group B in case we want to run a special topics course that will not count towards obtaining a degree.

There is no cost of implementation for these curricular changes.

IV. Should this proposal affect any course or program in another school, a memo must be sent to the Dean of each school impacted and a copy of the memo(s) must be included with this proposal. In addition, the Deans of the affected schools must sign below to indicate their notification of this proposal.

By signing here, you are indicating your college's/school's notification of this proposal.

College/School	Dean	Signature
Education	Dr. Amanda Metcalf	Amanda Metcalf
Sci & Tech	Steven Roof	Steven Roof

V. Should this proposal affect any course to be added or deleted from the general studies requirements, a memo from the chair of the General Studies Committee indicating approval of the change must be included with this proposal.
N/A – this proposal does not affect any general studies requirements

VI. ADDITIONAL COMMENTS.

APPENDIX A

B.S. Degree in Mathematics
Current Program

Required Major Courses		HRS
MATH 1550	Applied Statistics	3
MATH 1561	Introduction to Mathematical Reasoning	3
MATH 2501	Calculus I	4
MATH 2502	Calculus II	4
MATH 2510	Mathematical Logic	3
MATH 2563	Transition to Higher Mathematics	3
MATH 3503	Calculus III	4
MATH 3520	Linear Algebra	3
MATH 3550	Probability	3
MATH 4520	Abstract Algebra	3
COMP 1120	Principles of Programming I	3
TOTAL Required Major Courses		36
Major Electives		9
Group A (must take at least one in Group A):		
MATH 4580	Topology	3
MATH 4590	Real Analysis	3
Group B:		
MATH 2520	Introduction to the Theory of Numbers	3
MATH 2562	Introduction to Discrete Mathematics	3
MATH 3504	Differential Equations	3
MATH 3540	Numerical Analysis	3
MATH 3570	Modern Geometry	3
Minor Requirements/Electives (if minor is required)		18-24
TOTAL HOURS FOR MAJOR (and minor if required)		**63-69**

APPENDIX A (continued)

Required General Studies Courses (example text highlighted)	
Attribute IA – Critical Analysis	3
ENGL 1102 or any course in IA	
Attribute IB – Quantitative Literacy	X
MATH 2501 (satisfied in major)	
Attribute IC – Written Communication	3
ENGL 1101 or any course in IC	
Attribute ID – Teamwork	3
COMM 2200 (or any in ID)	
Attribute IE – Information Literacy	X
ENGL 1102 (satisfied above) or any IE	
Attribute IF – Technology Literacy	3
Any in IF	
Attribute IG – Oral Communication	X
COMM 2200 (satisfied above) or any in IG	
Attribute III – Citizenship	3
POLI 1100 or any in III	
Attribute IV – Ethics	3
ENGL 2220 or any course in IV	
Attribute V – Health	2-3
PHED 1100 or any V	
Attribute VI – Interdisciplinary	X
POLI 1100 (satisfied above) or or any course in VI	
Attribute VIIA – Arts	3
Any course in VIIA	
Attribute VIIB – Humanities	X
ENGL 2200 (satisfied above) or any course in VIIB	
Attribute VIIC – Social Sciences	3
GEOG 2210 or any course in VIIC	
Attribute VIID - Natural Science	4-5
PHYS 1101, PHYS 1105, CHEM 1101, CHEM 1105, BIOL 1105, BIOL 1106, GEOL 1101 (satisfied by major)	
Attribute VIII – Cultural Awareness	X
GEOG 2210 (satisfied above) or any course in VIII	
Additional General Studies hours	X
MATH 4520 (writing intensive, satisfied in major)	
TOTAL GENERAL STUDIES HOURS	**30-32**
TOTAL FREE ELECTIVES	**19-27**
TOTAL HOURS	**120**

APPENDIX A (continued)

B.S. Degree in Mathematics
Proposed Program

Required Major Courses		HRS
MATH 1550	Applied Statistics	3
MATH 1561	Introduction to Mathematical Reasoning	3
MATH 2501	Calculus I	4
MATH 2502	Calculus II	4
MATH 2563	Transition to Higher Mathematics	3
MATH 3503	Calculus III	4
MATH 3520	Linear Algebra	3
MATH 3550	Probability	3
MATH 4520	Abstract Algebra	3
COMP 1110	Introduction to Programming	3
OR		
COMP 1120	Principles of Programming I	3
TOTAL Required Major Courses		33
Major Electives		12
Group A (must take at least one in Group A):		
MATH 4580	Topology	3
MATH 4590	Real Analysis	3
Group B:		
MATH 2299	Special Topics	3
MATH 2510	Mathematical Logic	3
MATH 2520	Introduction to the Theory of Numbers	3
MATH 2562	Introduction to Discrete Mathematics	3
MATH 3399	Special Topics	3
MATH 3504	Differential Equations	3
MATH 3540	Numerical Analysis	3
MATH 3570	Modern Geometry	3
MATH 4499	Special Topics	3
Minor Requirements/Electives (if minor is required)		18-24
TOTAL HOURS FOR MAJOR (and minor if required)		**63-69**

APPENDIX A (continued)

Required General Studies Courses (example text highlighted)	
Attribute IA – Critical Analysis	3
ENGL 1102	
Attribute IB – Quantitative Literacy	X
MATH 2501 (satisfied in major)	
Attribute IC – Written Communication	3
ENGL 1101	
Attribute ID – Teamwork	3
COMM 2200 (or any in ID)	
Attribute IE – Information Literacy	X
ENGL 1102 (satisfied above) or any IE	
Attribute IF – Technology Literacy	3
Any in IF	
Attribute IG – Oral Communication	X
COMM 2200 (satisfied above) or any in IG	
Attribute III – Citizenship	3
POLI 1100 or any in III	
Attribute IV – Ethics	3
ENGL 2220 or any course in IV	
Attribute V – Health	2-3
PHED 1100 or any V	
Attribute VI – Interdisciplinary	X
POLI 1100 (satisfied above) or any course in VI	
Attribute VIIA – Arts	3
Any course in VIIA	
Attribute VIIB – Humanities	X
ENGL 2200 (satisfied above) or any course in VIIB	
Attribute VIIC – Social Sciences	3
GEOG 2210 or any course in VIIC	
Attribute VIID - Natural Science	4-5
PHYS 1101, PHYS 1105, CHEM 1101, CHEM 1105, BIOL 1105, BIOL 1106, GEOL 1101 (satisfied by major)	
Attribute VIII – Cultural Awareness	X
GEOG 2210 (satisfied above) or any course in VIII	
Additional General Studies hours	X
MATH 4520 (writing intensive, satisfied in major)	
TOTAL GENERAL STUDIES HOURS	**30-32**
TOTAL FREE ELECTIVES	**19-27**
TOTAL HOURS	**120**

APPENDIX A (continued)

B.A. Education, Specialization in Mathematics Grades 5-Adult

Current Program

Required Major Courses		HRS
MATH 1550	Applied Statistics	3
MATH 1561	Introduction to Mathematical Reasoning	3
MATH 2501	Calculus I	4
MATH 2502	Calculus II	4
MATH 2510	Mathematical Logic	3
MATH 2554	Topics in Math History	2
MATH 2562	Introduction to Discrete Mathematics	3
MATH 2563	Transition to Higher Mathematics	3
MATH 3503	Calculus III	4
MATH 3520	Linear Algebra	3
MATH 3550	Probability	3
MATH 3570	Modern Geometry	3
MATH 4520	Abstract Algebra	3
COMP 1120	Principles of Programming I	3
TOTAL Required Major Courses		47
Major Electives		
MATH 4580	Topology	3
OR		
MATH 4590	Real Analysis	3
Professional education as required by School of Education		33
TOTAL HOURS FOR MAJOR (and minor if required)		**83**

APPENDIX A (continued)

Required General Studies Courses		
Outcome 1 – Critical Analysis		3
	ENGL 1102* or any course in Outcome 1	
Outcome 2 – Quantitative Literacy		X
	MATH 2501 (satisfied in major)	
Outcome 3 – Written Communication		3
	ENGL 1101* or any course in Outcome 3	
Outcome 4 - Teamwork		3
	COMM 2200* or any course in Outcome 4	
Outcome 5 – Information Literacy		X
	ENGL 1102* (met in Outcome 1) or any course in Outcome 5	
Outcome 6 – Technology Literacy		3
	EDUC 2201 (required for major)	
Outcome 7 – Oral Communication		X
	COMM 2200* (met in Outcome 4) or any course in Outcome 7	
Outcome 8 - Citizenship		3
	POLI 1103* or any course in Outcome 8	
Outcome 9 - Ethics		3
	ENGL 2220* or any course in Outcome 9	
Outcome 10 - Health		3
	EDUC 2203 (required for major)	
Outcome 11 - Interdisciplinary		X
	POLI 1103* (met in Outcome 8) or any course in Outcome 11	
Outcome 12 - Arts		3
	Any course in Outcome 12	
Outcome 13 - Humanities		X
	ENGL 2220* (met in Outcome 9) or any course in Outcome 13	
Outcome 14 – Social Sciences		3
	GEOG 2210* or any course in Outcome 14	
Outcome 15 - Natural Science		4-5
	PHYS 1101, PHYS 1105, CHEM 1101, CHEM 1105, BIOL 1105, BIOL 1106, GEOL 1101 (required for major)	
Outcome 16 – Cultural Awareness		X
	GEOG 2210* (met in Outcome 14) or any course in Outcome 16	
Additional General Studies hours		X
	MATH 4520 (WIC – satisfied in major)	
	*Starred courses are recommended choices. Choosing a different course may result in more than 120 hours needed to graduate.	
TOTAL GENERAL STUDIES HOURS		**31-32**
TOTAL FREE ELECTIVES		**6**
TOTAL HOURS *(depending on whether a student takes a 4 or 5 hour science course)*		**120-121**

APPENDIX A (continued)

B.A. Education, Specialization in Mathematics Grades 5-Adult

Proposed Program

Required Major Courses		HRS
MATH 1550	Applied Statistics	3
MATH 1561	Introduction to Mathematical Reasoning	3
MATH 2501	Calculus I	4
MATH 2502	Calculus II	4
MATH 2554	Topics in Math History	2
MATH 2562	Introduction to Discrete Mathematics	3
MATH 2563	Transition to Higher Mathematics	3
MATH 3503	Calculus III	4
MATH 3520	Linear Algebra	3
MATH 3550	Probability	3
MATH 3570	Modern Geometry	3
MATH 4520	Abstract Algebra	3
COMP 1110	Introduction to Programming	3
OR		
COMP 1120	Principles of Programming I	3
TOTAL Required Major Courses		44
Major Electives		6
Group A (must take at least one in Group A):		
MATH 4580	Topology	3
MATH 4590	Real Analysis	3
Group B		
MATH 2299	Special Topics	3
MATH 2510	Mathematical Logic	3
MATH 2520	Introduction to the Theory of Numbers	3
MATH 3399	Special Topics	3
MATH 3504	Differential Equations	3
MATH 3540	Numerical Analysis	3
MATH 4499	Special Topics	3
Professional education as required by School of Education		33
TOTAL HOURS FOR MAJOR (and minor if required)		**83**

APPENDIX A (continued)

Required General Studies Courses		
Outcome 1 – Critical Analysis		3
	ENGL 1102* or any course in Outcome 1	
Outcome 2 – Quantitative Literacy		X
	MATH 2501 (satisfied in major)	
Outcome 3 – Written Communication		3
	ENGL 1101* or any course in Outcome 3	
Outcome 4 - Teamwork		3
	COMM 2200* or any course in Outcome 4	
Outcome 5 – Information Literacy		X
	ENGL 1102* (met in Outcome 1) or any course in Outcome 5	
Outcome 6 – Technology Literacy		3
	EDUC 2201 (required for major)	
Outcome 7 – Oral Communication		X
	COMM 2200* (met in Outcome 4) or any course in Outcome 7	
Outcome 8 - Citizenship		3
	POLI 1103* or any course in Outcome 8	
Outcome 9 - Ethics		3
	ENGL 2220* or any course in Outcome 9	
Outcome 10 - Health		3
	EDUC 2203 (required for major)	
Outcome 11 - Interdisciplinary		X
	POLI 1103* (met in Outcome 8) or any course in Outcome 11	
Outcome 12 - Arts		3
	Any course in Outcome 12	
Outcome 13 - Humanities		X
	ENGL 2220* (met in Outcome 9) or any course in Outcome 13	
Outcome 14 – Social Sciences		3
	GEOG 2210* or any course in Outcome 14	
Outcome 15 - Natural Science		4-5
	PHYS 1101, PHYS 1105, CHEM 1101, CHEM 1105, BIOL 1105, BIOL 1106, GEOL 1101 (required for major)	
Outcome 16 – Cultural Awareness		X
	GEOG 2210* (met in Outcome 14) or any course in Outcome 16	
Additional General Studies hours		X
	MATH 4520 (WIC – satisfied in major)	
	*Starred courses are recommended choices. Choosing a different course may result in more than 120 hours needed to graduate.	
TOTAL GENERAL STUDIES HOURS		**31-32**
TOTAL FREE ELECTIVES		**6**
TOTAL HOURS *(depending on whether a student takes a 4 or 5 hour science course)*		**120-121**

Appendix B

New Course Descriptions

MATH 2299 (Special Topics in Mathematics): Studies in special selected topics, to be determined by the instructor and approved by the department chair. Credits earned will be applicable as free electives in degree and certificate programs. Courses with this number must have a prerequisite of MATH 2501 (Calculus I) or MATH 1561 (Introduction to Mathematical Reasoning) or greater.

MATH 3399 (Special Topics in Mathematics): Studies in special selected topics, to be determined by the instructor and approved by the department chair. Credits earned will be applicable as free electives in degree and certificate programs. Courses with this number must have a prerequisite of MATH 2502 (Calculus II) or both MATH 2501 (Calculus I) and MATH 1561 (Introduction to Mathematical Reasoning) or greater.

MATH 4499 (Special Topics in Mathematics): Studies in special selected topics, to be determined by the instructor and approved by the department chair. Credits earned will be applicable as free electives in degree and certificate programs. Courses with this number must have a prerequisite of MATH 2502 (Calculus II) and MATH 2563 (Transition to Higher Mathematics) or greater.

Re: Course numbers for new math courses

Cuchta, Thomas <tcuchta@fairmontstate.edu>
Fri 06-Dec-19 12:43
To: Gonzalez, Cheri <Cheri.Gonzalez@fairmontstate.edu>

Dear Cheri,

ok thank you.

Cheers,
Tom

From: Gonzalez, Cheri <Cheri.Gonzalez@fairmontstate.edu>
Sent: Friday, December 6, 2019 12:42
To: Cuchta, Thomas <tcuchta@fairmontstate.edu>
Subject: RE: Course numbers for new math courses

yes

Cheri L. Gonzalez
University Registrar
Fairmont State University
304-367-4112
Cheri.Gonzalez@fairmontstate.edu

FAIRMONT STATE UNIVERSITY

From: Cuchta, Thomas
Sent: Friday, December 06, 2019 9:46 AM
To: Gonzalez, Cheri <Cheri.Gonzalez@fairmontstate.edu>
Subject: Re: Course numbers for new math courses

Dear Cheri,

they will be special topics courses, identical to MATH 1199. We are introducing them so that we have special topics courses that are not all 1000-level so that their level may better match the contents of the courses.

Is that still okay?

Thanks,
Tom

From: Gonzalez, Cheri <Cheri.Gonzalez@fairmontstate.edu>
Sent: Friday, December 6, 2019 09:44

Memo to Education Department

FAIRMONT STATE UNIVERSITY

Dr. Tom Cuchta
DEPT. OF COMP. SCI. & MATH
FAIRMONT STATE UNIVERSITY
1201 Locust Avenue, Fairmont, WV 26554

MEMO

Dear Dr. Sharon Smith

December 2019

The mathematics program has consensus and is working on a proposal to make the following changes to the B.A. Education, Specialization in Mathematics Grades 5-Adult curriculum (and equivalent changes to the B.S. in Mathematics):

1.) remove MATH 2510 (Mathematical Logic) as a required course and replace it with an approved mathematics elective ("Group A" or "Group B" as defined in the catalog),

2.) move MATH 2510 (Mathematical Logic) to the list of "Group B" electives, and

3.) allow COMP 1110 (Introduction to Programming) to satisfy the programming requirement for the major, so that it may be taken instead of COMP 1120. We will still accept COMP 1120 to satisfy this requirement.

These changes will not affect the total number of hours required for any student to complete the B.A. Education, Specialization in Mathematics Grades 5-Adult.

Sincerely,

Tom Cuchta

Dr. Tom Cuchta
Assistant Professor of Mathematics
Fairmont State University

Memo to Dean

FAIRMONT STATE UNIVERSITY

Dr. Tom Cuchta
DEPT. OF COMP. SCI. & MATH
FAIRMONT STATE UNIVERSITY
1201 Locust Avenue, Fairmont, WV 26554

MEMO

Dear Dr. Amanda Metcalf December 2019

With this memo, we would like to solicit a letter of support from you for our curriculum proposal.

The mathematics program has consensus and is working on a proposal to make the following changes to the B.A. Education, Specialization in Mathematics Grades 5-Adult curriculum (and equivalent changes to the B.S. in Mathematics):

1.) remove MATH 2510 (Mathematical Logic) as a required course and replace it with an approved mathematics elective ("Group A" or "Group B" as defined in the catalog),
2.) move MATH 2510 (Mathematical Logic) to the list of "Group B" electives, and
3.) allow COMP 1110 (Introduction to Programming) to satisfy the programming requirement for the major, so that it may be taken instead of COMP 1120. We will still accept COMP 1120 to satisfy this requirement.

These changes will not affect the total number of hours required for any student to complete the B.A. Education, Specialization in Mathematics Grades 5-Adult.

Sincerely,

tom Cuchta

Dr. Tom Cuchta
Assistant Professor of Mathematics
Fairmont State University

Dr. Tom Cuchta
DEPT. OF COMP. SCI. & MATH
FAIRMONT STATE UNIVERSITY
1201 Locust Avenue, Fairmont, WV 26554

January 2020

This letter is a response to the request that we provide course outlines, learning outcomes, and assessment criteria for the proposed MATH 2299, MATH 3399, and MATH 4499 special topics courses. The purpose of any special topics course is to be a venue for trial runs of possible new future courses. Since it is impossible to provide an outline, outcomes, and assessment information in a way that is universal among all possible future special topics courses, we believe these items are not needed in our curriculum proposal.

Any time a special topics course is proposed in the department, a course outline, outcomes, and assessment information is created for that individual instance of the special topics course. On the next page, we provide a sample of these materials that was generated for the Fall 2019 instance of MATH 1199 called "Complex Variables".

If the committee is not satisfied with us omitting the requested materials, then we propose including the outline, outcomes, and assessment criteria for the Complex Variables course below in the curriculum as a representative sample of all three proposed courses MATH 2299, MATH 3399, and MATH 4499.

Sincerely,

Dr. Tom Cuchta
Assistant Professor of Mathematics
Fairmont State University

Detailed course outline for MATH 1199 (Complex Variables)

1. The complex plane
    a. Arithmetic with complex numbers
    b. Modulus
    c. Complex conjugate
    d. Polar representation
    e. Roots
2. Elementary C-valued functions\
    a. Visualizations of C-valued functions
    b. Branches and branch cuts
    c. Exponential and the (multi-valued) logarithm
    d. (Multi-valued) nth root functions
    e. Trigonometric functions and their (multi-valued) inverses
    f. Hyperbolic trigonometric functions and their (multi-valued) inverses
    g. Linear fractional transformations
3. Calculus in C
    a. Limits
    b. Complex differentiation
    c. Cauchy-Riemann equations
    d. C-analytic vs R-analytic
    e. Contour integrals
    f. ML-inequality (``estimation lemma'')
    g. Cauchy integral formula
4. Power series in C
    a. Poles and essential singularities
    b. Taylor series
    c. Laurent series
    d. Residues and residue theorem
    e. ``Difficult'' integrals on the real line via residue theorem

Outcomes:
Outcome 1: Be able to compute and use common complex-valued functions, including exponentials, logarithms, and complex exponents.

Outcome 2: Use the Cauchy-Riemann equations to explain why a function is or is not complex-differentiable.

Outcome 3: Understand how complex variables relates the planar geometry of circles and lines via Mobius transformations.

Outcome 4: Calculate complex integrals in a variety of ways, including parametrization, via Cauchy integral theorem, and via the residue theorem.

Outcome 5: Apply residue calculus to a computation.

Method of assessment:
All of these outcomes are related to computational techniques. Problems on homework or exams may be used to assess the outcomes.