WOU
Curriculum Log

Degree Program Change

Degree Program: B.S., B.A.

Academic Major: Mathematics, Mathematics Education

A) Describe the proposed degree program change(s) in terms of how the changes differ from the program as currently approved and published in the latest University catalog (specify the latest catalog date).

Over the last two years, the Mathematics Department has gone through an intensive self-study process, complete with an external evaluation. As a result, we have updated our curriculum and have changed the credit structure of the majority of courses. The update will allow us to offer a program that aligns better with national standards and with our local situation. These changes are approved by the Faculty Curriculum Committee and the Faculty Senate of WOU and they will appear in the 2008 – 09 University catalog.

In the following, we address both questions A and B.

We cite three documents, *Guidelines for Programs and Departments in Undergraduate Mathematical Sciences, Revised Edition*, The Mathematical Association of America, 2003; *Undergraduate Programs and Courses in the Mathematical Sciences: CUPM Curriculum Guide 2004*, The Mathematical Association of America, 2004; and *The Mathematical Education of Teachers*, Conference Board of the Mathematical Sciences Issues in Mathematics Education Series, Volume 11, 2001. We refer to them as *Guidelines*, *CUPM*, and *MET*, respectively.

Summary and Rationale of Proposed Revisions in Mathematics

1. **Change in Course Name and/or Course Number**
   We propose to rename and/or renumber seven courses.

   Change MTH 099 Pre-College Algebra to MTH 095 Intermediate Algebra. This aligns the course with other OUS Institutions and will help with transfer articulation. Previously, the material in MTH 099 was a combination of the material from the MTH 070 Introductory Algebra and MTH 095 courses offered at the other OUS institutions. Since 2006, the Mathematics Department has taught MTH 070 and modified the material for MTH 099 to match with MTH 095 only.

   Change the name of MTH 363 Linear Programming and Games to MTH 363 Introduction to Operations Research. The change makes the title more aligned with current terminology.

Change the names of MTH 410, MTH 420, MTH 430, MTH 440, and MTH 460 from Advanced Topics to Special Topics. For example, MTH 410 Advanced Topics: Analysis to MTH 410 Special Topics: Analysis. The change makes the title reflect current practice.

2. **Change in Prerequisite**

The current prerequisite for MTH 346 Number Theory is MTH 252 with a grade of C- or better. We would like to change this prerequisite to MTH 280 with a grade of C- or better. Since this is a proof-driven course, in order to have success, students need to have taken MTH 280 to expose them to a variety of proof methods they will need in the course.

3. **Course Deletions**

Guidelines (number D.2.d) recommends "Courses that are not scheduled at least every two years should not be listed in the college catalog." Therefore, we propose to delete six courses from the course catalog. None of them will be offered regularly in the future. With the exception of MTH 482, none of them have run successfully in many years. Each of these could become Special Topics courses if there is enough interest.

Delete: MTH 414 Differential Equations II, MTH 437 Topology, MTH 439 Transformational Geometry, MTH 446 Abstract Algebra, MTH 482 Foundations of Mathematics, and MTH 498/598 Computer Applications in Math.

4. **Course Additions**

We propose to add two courses to the course catalog.

Add MTH 358 Mathematics Modeling to the course catalog. Math modeling is the traditional cornerstone of applied mathematics. It teaches a highly marketable skill. Part II of *CUPM* repeatedly mentions the importance of modeling in the undergraduate curriculum. Modeling is currently underrepresented in our curriculum. We also plan to make the course attractive to other majors, biology, for example. The course will have the following description:
Construction, analysis, and interpretation of a variety of mathematical models that arise from real-world problems. PREREQ: MTH 254 and MTH 341 with a grade of C- or better.

Add MTH 411 Mathematics Education Capstone to the course catalog. *MET* recommends a capstone experience for students majoring in Mathematics Education. A student in this course will normally examine secondary mathematics content from an advanced point of view as recommended in *MET*. The course will have the following description:
Terms to be arranged before entering the Education Program

The description mirrors the MTH 403 capstone description for the regular mathematics major and is designed to give flexibility on the exact nature of the capstone. For example, it could be a seminar, an extensive research paper, or even an original research project.

5. **Credit Changes for Math Major and Minor Courses MTH 280 and Above**

We propose almost all courses for mathematics majors and minors, MTH 280 and above, become four credit courses. Currently, four such courses are four credits. The rest are three credits. Recognizing this as the most significant of our proposed changes, we will give more rationale here than elsewhere.

Quoting from our departmental self-study, "by changing [to four credits], we hope to add depth our the courses and make the number of contact hours per term closer to the number of contact hours in a semester, not to mention the number of contact hours for which many textbooks are designed." We believe the added depth and the closer alignment with textbook syllabi will be beneficial for students.

The switch to four credits and the accompanying decrease in the number of different courses required for the major will benefit mathematics majors who are not prepared to take calculus during their first quarter at WOU. In order to finish in four years, such students currently must take three upper division math classes per term in each of four terms (at least). In theory, that is possible. In practice, it is fatal. We do not believe any student has successfully done it. Under the proposed system, such students should only have to take three upper division courses once, which is quite manageable.

There is no use hiding the obvious benefit for faculty. *Guidelines* (number C.5.a.ii) warn "Faculty for whom personnel decisions are based upon assessment of contributions in teaching, scholarship, and service should have teaching assignments that reflect these multiple expectations . . . Teaching assignments above three courses per semester, when combined with other faculty responsibilities, do not allow the time needed to develop and maintain a program of sustained scholarship with the result that tenure and promotion might be effectively unattainable. For such faculty, teaching assignments above the level of three courses per semester must be avoided." The switch to four credits will eliminate having to teach four courses per term and, thus, allows us to satisfy the *Guidelines* recommendation, which we believe accurately reflects the tenure/ promotion criteria at WOU.

The review committee for our departmental self-study, consisting of three outside evaluators, backed our decision to change to four credits for these courses. In their report, they wrote, "The Committee agrees that the move to four credit courses would strengthen the upper division courses and provide for more reasonable teaching loads for faculty, by reducing the number of course preparations for faculty. This change may also provide greater flexibility for students."

Even though the department will be restructuring the majority of upper division classes for mathematics majors and minors, the allocation of FTE will be unaffected by this switch. In the academic years 2005-06, 2006-07, and 2007-08, the FTE for courses for mathematics majors/minors, MTH 280 and above, has been sixty-four hours, sixty-five hours, and sixty-five hours, respectively. With the proposed changes, the FTE for these courses will remain at sixty-five hours.

From the students' point of view, the total number of credit hours for all mathematics majors increases by exactly one hour, while the number of courses required decreases. Students pursuing a mathematics minor currently take four courses to satisfy the minor requirement of twelve credits of upper division electives. With the restructuring, these students will still take four upper division electives, but the number of credits will increase to fifteen.

The following courses will change from three credits to four credits:
MTH 280 Introduction to Proofs
MTH 314 Differential Equations I
MTH 337 Geometry
MTH 338 Axiomatic Geometry
MTH 344 Group Theory
MTH 345 Ring Theory
MTH 346 Number Theory
MTH 351 Introduction to Numerical Analysis
MTH 355 Discrete Mathematics
MTH 363 Linear Programming and Games
MTH 365 Mathematical Probability
MTH 366 Mathematical Statistics
MTH 416 Complex Analysis
MTH 441/541 Linear Algebra II
MTH 451 Numerical Analysis
MTH 472 History of Mathematics

The Special Topics courses, MTH 410, MTH 420, MTH 430, MTH 440, and MTH 460 will remain at three credits. Since these courses have a narrow focus, we feel the material can be adequately covered in a three credit course.

6. **Revised Requirements for the Mathematics Majors and Minors**

With the proposed change in credit hours in the majority of courses for mathematics majors/minors, the degree requirements would need to be changed. While modifying the degree requirements, the department decided to introduce two tracks for students pursuing a Mathematics Degree, the Mathematics Track and the Applied Mathematics Track. Offering these tracks permits us to prepare students for mathematical careers in the public and private sectors as well as for teaching (following an MAT) and graduate study in mathematics.

The degree requirements for current mathematics majors and mathematics education majors, who will not be graduating this year, will be basically unchanged. We will adjust the number of required electives for each student on an individual basis so that the required number of credit hours remains the same as it was when they entered Western Oregon University.

7. **Measuring Effectiveness of Change on Majors**

As a result of our departmental self-study last February, we began to give exit interviews to graduating math majors in the 2006-07 Academic Year. We will begin to administer the Major Field Test in Mathematics, put out by ETS, to graduating mathematics majors in the 2007-08 Academic Year. We conducted an

alumni survey of graduates from the past five years. We will administer the alumni survey every five years and continue to annually interview and test the graduating majors. All of this will provide data from which we may see how the program changes have affected mathematics majors.

Below are the detailed changes from the program as currently approved and published in the 2007 – 08 University catalog.

DETAILED TABLE OF PROPOSED COURSE CHANGES

COURSE	NATURE OF CHANGE	JUSTIFICATION	STUDENTS / PROGRAMS AFFECTED
MTH 099 Pre-College Algebra	Title and Number Change from MTH 099 – Pre-College Algebra to MTH 095 – Intermediate Algebra	Material in course was modified in 2006 to match material in MTH 095 offered at the other OUS institutions. Help with transfer articulation.	Students preparing to take MTH 111 or MTH 211
MTH 280 Introduction to Proofs	Credit Change from Three to Four Credits	Add depth to course; Make contact hours closer to semester hours; Allow dept to satisfy *Guidelines* suggestion of teaching 3 courses per quarter.	Mathematics, Mathematics Education and Computer Science / Mathematics Majors
MTH 314 Differential Equations I	Credit Change from Three to Four Credits and Title Change to MTH 314 Differential Equations	Add depth to course; Make contact hours closer to semester hours; Allow dept to satisfy *Guidelines* suggestion of teaching 3 courses per quarter. There is no longer a Diff Equations II.	Mathematics, Mathematics Education and Computer Science / Mathematics Majors; Mathematics and Physics Minors
MTH 337 Geometry	Credit Change from Three to Four Credits	Add depth to course; Make contact hours closer to semester hours; Allow dept to satisfy *Guidelines* suggestion of teaching 3 courses per quarter.	Mathematics and Mathematics Education Majors; Math and Physics Minors
MTH 338 Axiomatic Geometry	Credit Change from Three to Four Credits	Add depth to course; Make contact hours closer to semester hours; Allow dept to satisfy *Guidelines* suggestion of teaching 3 courses per quarter.	Mathematics and Mathematics Education Majors; Math and Physics Minors
MTH 344 Group Theory	Credit Change from Three to Four Credits	Add depth to course; Make contact hours closer to semester hours; Allow dept to satisfy *Guidelines* suggestion of teaching 3 courses per quarter.	Mathematics, Mathematics Education and Computer Science / Mathematics Majors; Math and Physics Minors
MTH 345 Ring Theory	Credit Change from Three to Four Credits	Add depth to course; Make contact hours closer to semester hours; Allow dept to satisfy *Guidelines* suggestion of teaching 3 courses per quarter.	Mathematics, Mathematics Education and Computer Science / Mathematics Majors; Math and Physics Minors
MTH 346 Number Theory	Credit Change from Three to Four Credits and Prerequisite Change to MTH 280	Add depth to course; Make contact hours closer to semester hours; Allow dept to satisfy *Guidelines* suggestion of teaching 3 courses per quarter. Proof methods needed before course.	Mathematics, Mathematics Education and Computer Science / Mathematics Majors; Math and Physics Minors

COURSE	NATURE OF CHANGE	JUSTIFICATION	STUDENTS / PROGRAMS AFFECTED
MTH 351 Introduction to Numerical Analysis	Credit Change from Three to Four Credits	Add depth to course; Make contact hours closer to semester hours; Allow dept to satisfy *Guidelines* suggestion of teaching 3 courses per quarter.	Mathematics, Mathematics Education and Computer Science / Mathematics Majors; Math and Physics Minors
MTH 355 Discrete Mathematics	Credit Change from Three to Four Credits	Add depth to course; Make contact hours closer to semester hours; Allow dept to satisfy *Guidelines* suggestion of teaching 3 courses per quarter.	Mathematics, Mathematics Education and Computer Science / Mathematics Majors; Math and Physics Minors
MTH 358 Mathematical Modeling	New Course	Designed to serve students pursuing the Applied Mathematics Track.	Mathematics, Math Ed and Computer Science / Math Majors; Math and Physics Minors
MTH 363 Linear Programming and Games	Credit Change from Three to Four Credits and Title Change to MTH 363 Introduction to Operations Research	Add depth to course; Make contact hours closer to semester's; Allow dept to satisfy *Guidelines* suggestion of 3 courses/qtr. Title is more appropriate.	Mathematics, Mathematics Education and Computer Science / Mathematics Majors; Math and Physics Minors
MTH 365 Mathematical Probability	Credit Change from Three to Four Credits	Add depth to course; Make contact hours closer to semester hours; Allow dept to satisfy *Guidelines* suggestion of teaching 3 courses per quarter.	Mathematics, Mathematics Education and Computer Science / Mathematics Majors; Math and Physics Minors
MTH 366 Mathematical Statistics	Credit Change from Three to Four Credits	Add depth to course; Make contact hours closer to semester hours; Allow dept to satisfy *Guidelines* suggestion of teaching 3 courses per quarter.	Mathematics, Mathematics Education and Computer Science / Mathematics Majors; Math and Physics Minors
MTH 410 Advanced Topics: Analysis	Title Change to Special Topics: Analysis	The change makes the title reflect current practice.	Mathematics and Mathematics Education Majors; Math and Physics Minors
MTH 411 Capstone Experience for Mathematics Education	New Course	Mathematics Education of Teachers document recommends these students have a capstone experience.	Mathematics Education Majors
MTH 414 Differential Equations II	Delete Course	Course has not successfully run in over ten years and can be offered as Special Topics course if there is interest.	Mathematics, Mathematics Education and Computer Science / Mathematics Majors; Math and Physics Minors
MTH 416 Complex Analysis	Credit Change from Three to Four Credits	Add depth to course; Make contact hours closer to semester hours; Allow dept to satisfy *Guidelines* suggestion of teaching 3 courses per quarter.	Mathematics and Mathematics Education Majors; Math and Physics Minors

COURSE	NATURE OF CHANGE	JUSTIFICATION	STUDENTS / PROGRAMS AFFECTED
MTH 420 Advanced Topics: Applied Mathematics	Title Change to Special Topics: Applied Mathematics	The change makes the title reflect current practice.	Math, Math Ed and Computer Science / Math Majors; Math and Physics Minors
MTH 430 Advanced Topics: Geometry	Title Change to Special Topics: Geometry	The change makes the title reflect current practice.	Mathematics and Mathematics Education Majors; Math and Physics Minors
MTH 437 Topology	Delete Course	Course has not successfully run in over ten years and can be offered as Special Topics course if there is interest.	Mathematics and Mathematics Education Majors; Math and Physics Minors
MTH 439 Transformational Geometry	Delete Course	Course has not successfully run in over ten years and can be offered as Special Topics course if there is interest.	Mathematics and Mathematics Education Majors; Math and Physics Minors
MTH 440 Advanced Topics: Algebra	Title Change to Special Topics: Algebra	The change makes the title reflect current practice.	Mathematics and Mathematics Education Majors; Math and Physics Minors
MTH 441/541 Linear Algebra II	Credit Change from Three to Four Credits	Add depth to course; Make contact hours closer to semester hours; Allow dept to satisfy *Guidelines* suggestion of teaching 3 courses per quarter.	Mathematics, Mathematics Education and Computer Science / Mathematics Majors; Math and Physics Minors
MTH 446 Abstract Algebra	Delete Course	Course has not successfully run in over ten years and can be offered as Special Topics course if there is interest.	Mathematics and Mathematics Education Majors; Math and Physics Minors
MTH 451 Numerical Analysis	Credit Change from Three to Four Credits	Add depth to course; Make contact hours closer to semester hours; Allow dept to satisfy *Guidelines* suggestion of teaching 3 courses per quarter.	Mathematics, Mathematics Education and Computer Science / Mathematics Majors; Math and Physics Minors
MTH 460 Advanced Topics: Probability and Statistics	Title Change to Special Topics: Probability and Statistics	The change makes the title reflect current practice.	Mathematics, Mathematics Education and Computer Science / Mathematics Majors; Math and Physics Minors
MTH 472 History of Mathematics	Credit Change from Three to Four Credits	Add depth to course; Make contact hours closer to semester hours; Allow dept to satisfy *Guidelines* suggestion of teaching 3 courses per quarter.	Mathematics and Mathematics Education Majors; Math and Physics Minors
MTH 482 Foundations of Mathematics	Delete Course	Course cannot fit in current rotation of courses. Can be offered as Special Topics course if there is interest.	Mathematics and Mathematics Education Majors; Math and Physics Minors
MTH 498/598 Computer Applications in Math	Delete Course	Course is no longer part of summer rotation of classes.	MS in Ed students with a MTH content focus

Mathematics Degree Requirements

Introduce Mathematics Track

Current Requirements			**New Requirements**	
Course Name	**Credits**		**Course Name**	**Credits**
CS 161	5		CS 161	5
MTH 251 Calculus I	5		MTH 251	5
MTH 252 Calculus II	5		MTH 252	5
MTH 253 Calculus III	3		MTH 253	3
MTH 254 Calculus IV	5		MTH 254	5
MTH 280 Proofs	3		MTH 280	4
MTH 311 Advanced Calculus I	4		MTH 311	4
MTH 312 Advanced Calculus II	4		MTH 312	4
MTH 341 Intro to Linear Algebra	4		MTH 341	4
MTH 344 Group Theory	3		MTH 344	4
MTH 345 Ring Theory	3		MTH 345	4
MTH 365 Probability	3		MTH 365	4
MTH 366 Statistics	3		MTH 366	4
MTH 403 Senior Project	4		MTH 403	4
Upper Division Electives	16		Four Approved Upper Division Electives	15 - 16
MTH 410, MTH 420, MTH 430, MTH 440, or MTH 460 Adv Topics	3			
Total Credits	73			74 - 75

Summary of Changes to the Mathematics Major

We have introduced two tracks for students majoring in mathematics. The degree requirements for students pursuing the first track, which will be called the Mathematics Track, are a slight modification to the current requirements for a mathematics major. With the Mathematics Track, students will no longer be required to take an Advanced Topics course and the number of upper division elective hours will decrease by one hour. With the current requirements, students usually take six upper division electives, including the required Advanced Topics course. With the new requirements, students will take four upper division electives, in which at most one of them may be an Advanced Topics course. With the additional credit hour added to six of the required classes, reducing the elective requirement more closely aligns the new and old degree credit-hour requirements.

Mathematics Degree Requirements – Applied Mathematics Track

Applied Mathematics Track Requirements	
Course Name	**Credits**
CS 161	5
MTH 251 Calculus I	5
MTH 252 Calculus II	5
MTH 253 Calculus III	3
MTH 254 Calculus IV	5
MTH 280 Proofs	4
MTH 311 Advanced Calculus I	4
MTH 312 Advanced Calculus II	4
MTH 341 Intro to Linear Algebra	4
MTH 365 Probability	4
MTH 366 Statistics	4
MTH 403 Senior Project	4
Three of the Four Following Courses MTH 314 Differential Equations MTH 351 Intro to Numerical Analysis MTH 355 Discrete Mathematics MTH 358 Mathematical Modeling	12
Three Approved Upper Division Electives	11 - 12
Total Credits	74 - 75

The other track, which will be called the Applied Mathematics Track, was created to better prepare students who wish to enter the private sector or graduate study in applied mathematics. The creation of the Applied Mathematics Track, with the associated new modeling course, gives more opportunities for the students to be exposed to applied mathematics, deterministic and stochastic models, and interdisciplinary applications. The degree requirements for the Applied Mathematics Track are very similar to those for the Mathematics Track. In the Applied Mathematics Track, we have removed the requirement for MTH 344 Group Theory and MTH 345 Ring Theory, but require students pursuing this track to choose three of four courses in applied mathematics. With the addition of the three courses in applied mathematics and the deletion of the courses in group theory and ring theory, we lowered the required number of electives from four to three for this track so that the Mathematics and Applied Mathematics Tracks have the same number of required credit hours.

Mathematics Education Major Degree Requirements

Current Requirements			**New Requirements**	
Course Name	**Credits**		**Course Name**	**Credits**
CS 161	5		CS 161	5
MTH 251 Calculus I	5		MTH 251	5
MTH 252 Calculus II	5		MTH 252	5
MTH 253 Calculus III	3		MTH 253	3
MTH 254 Calculus IV	5		MTH 254	5
MTH 280 Proofs	3		MTH 280	4
MTH 311 Advanced Calculus I	4		MTH 311	4
MTH 341 Intro to Linear Algebra	4		MTH 341	4
MTH 344 Group Theory	3		MTH 344	4
MTH 355 Discrete Mathematics	3		MTH 355	4
MTH 365 Probability	3		MTH 365	4
MTH 366 Statistics	3		MTH 366	4
MTH 337 Geometry or MTH 338 Axiomatic Geometry	3		MTH 337 or MTH 338	4
MTH 345 Ring Theory	3		MTH 345 **OR** MTH 346	4
MTH 346 Number Theory	3			
			MTH 411 Capstone Experience	4
Upper Division Electives	10		One Approved Upper Division Elective	3 - 4
Total Credits	65			66 - 67

Summary of Changes to the Mathematics Education Major

With the new degree requirements for a mathematics education major, we have added a Capstone Experience course for these students, as recommended by *MET*. The students will now have an option of taking MTH 345 Ring Theory or MTH 346 Number Theory. Currently, students are required to take both of these courses. Under the current requirements, students usually take three upper division electives. Under the new requirements, students will take only one upper division elective, which may be an Advanced Topics course. With the additional credit hour added to seven of the required classes and the addition of a Capstone Experience, it became unrealistic for a student to be able to finish the requirements in four years, including the four terms in the Education Program. By reducing the elective requirement, the degree remains attainable in four years.

Mathematics Minor Requirements

Current Requirements			**New Requirements**	
Course Name	**Credits**		**Course Name**	**Credits**
MTH 251 Calculus I	5		MTH 251	5
MTH 252 Calculus II	5		MTH 252	5
MTH 253 Calc III or MTH 254 Calc IV	3 - 5		MTH 253 or MTH 254	3 - 5
Approved Upper Division Electives	12		Approved Upper Division Electives	15
Total Credits	25 - 27			28 - 30

In both sets of requirements, students are required to take four upper division electives. We feel that in order for a minor in mathematics to have enough breadth, students pursuing this minor should take at least four upper division mathematics courses.

Computer Science / Mathematics Major Requirements

We will only modify the mathematics requirements for this major.

Current Requirements			**New Requirements**	
Course Name	**Credits**		**Course Name**	**Credits**
MTH 251 Calculus I	5		MTH 251	5
MTH 252 Calculus II	5		MTH 252	5
MTH 253 Calculus III	3		MTH 253	3
MTH 254 Calculus IV	5		MTH 254	5
MTH 280 Proofs	3		MTH 280	4
MTH 341 Intro to Linear Algebra	4		MTH 341	4
MTH 344 Group Theory	3		MTH 344	4
MTH 345 Ring Theory	3			
MTH 355 Discrete Mathematics	3		MTH 355	4
MTH 365 Probability	3		MTH 365	4
MTH 366 Statistics	3		MTH 366	4
Choose Four Electives MTH 311 Advanced Calculus MTH 314 Differential Equations I MTH 346 Number Theory MTH 351 Intro to Num. Analysis MTH 414 Differential Eqns II MTH 420 Advanced Topics: Applied Math MTH 441 Linear Algebra II MTH 451 Numerical Analysis MTH 460 Advanced Topics: Probability and Statistics	12 – 13		Choose Three Electives MTH 311 MTH 314 MTH 345 Ring Theory MTH 346 Number Theory MTH 351 MTH 358 Mathematical Modeling MTH 420 Advanced Topics: Applied Math MTH 441 Linear Algebra II MTH 451 Numerical Analysis MTH 460 Advanced Topics: Probability and Statistics	11 – 12
Total Credits	52 - 53			53 - 54

Summary of Changes to the Computer Science / Mathematics Major
Currently, students are required to take MTH 345 Ring Theory and four upper division electives. In the new requirements, the department has dropped the requirement of MTH 345 and lowered the required number of upper division electives to three. With the additional credit hour added to five of the required classes and the four electives, we felt that the degree became unrealistic if we required MTH 345 and four electives. We eliminated MTH 414 Differential Equations II as an elective option, as we plan to delete the course from the catalog. We have also added MTH 345 and MTH 358 Mathematical Modeling as options for electives.

DEGREE REQUIREMENTS APPEARING IN COURSE CATALOG

MATHEMATICS

Professor – Michael Ward. *Associate Professor* – Hamid Behmard, Laurie Burton, Maria Fung. *Assistant Professor* – Cheryl Beaver, Scott Beaver, Klay Kruczek

MATHEMATICS MAJOR……...……..……..**74-75**
REQUIRED MATHEMATICS CORE COURSES……..**51**
MTH 251 Calculus I ……...**5**
MTH 252 Calculus II……...**5**
MTH 253 Calculus III: Sequences and Series ……...**3**
MTH 254 Calculus IV: Multivariate Calculus ……...**5**
MTH 280 Introduction to Proofs…….……...**4**
MTH 311 Advanced Calculus I..…… ……...**4**
MTH 312 Advanced Calculus II.…….…..……...**4**
MTH 341 Linear Algebra ……..…….…..……...**4**
MTH 365 Mathematical Probability...…….…..……...**4**
MTH 366 Mathematical Statistics..…… ……...**4**
MTH 403 Senior Project …..…..…… ……...**4**
CS 161 Computer Science I ……... **5**

Select <u>ONE</u> of the Following 2 Tracks:

Mathematics Track….. …….……..**23**
MTH 344 Group Theory ……**4**
MTH 345 Ring Theory ……...**4**
Four Approved Upper Division Electives ……...……..……. **15-16**

Applied Mathematics Track …. ……..…..**23**
Choose Three ……**12**
- MTH 314 Differential Equations (4)
- MTH 351 Introduction to Numerical Analysis (4)
- MTH 355 Discrete Mathematics (4)
- MTH 358 Mathematical Modeling (4)

Three Approved Upper Division Electives ……...……..……**11-12**

MATHEMATICS MINOR……...…….……..……..**28-30**
MTH 251 Calculus I ……...**5**
MTH 252 Calculus II……...**5**
Choose One ……**3 - 5**
- MTH 253 Calculus III: Sequences and Series (3)
- MTH 254 Calculus IV: Multivariate Calculus (5)

Approved Upper Division Electives ……...……..…15

MATHEMATICS EDUCATION MAJOR…….……...……..**74-75**
MTH 251 Calculus I ……...**5**
MTH 252 Calculus II……...**5**
MTH 253 Calculus III: Sequences and Series ……...**3**
MTH 254 Calculus IV: Multivariate Calculus ……...**5**
MTH 280 Introduction to Proofs……..……...**4**
MTH 311 Advanced Calculus I..…… ……...**4**
MTH 341 Linear Algebra ……..……..……...**4**
MTH 344 Group Theory ……**4**
MTH 355 Discrete Mathematics ……**4**
MTH 365 Mathematical Probability...……..……...**4**
MTH 366 Mathematical Statistics..……..……...**4**
MTH 411 Capstone Experience ……..……...**4**
CS 161 Computer Science I ……... **5**
Choose one …….……...……..**4**
MTH 337 Geometry (4)
MTH 338 Axiomatic Geometry (4)
Choose one …….…. ……..**4**
MTH 345 Ring Theory (4)
MTH 346 Number Theory (4)
One Approved Upper Division Elective ……...…… .**3-4**

COMPUTER SCIENCE / MATHEMATICS MAJOR……..**106-107**
MATHEMATICS CORE COURSES ……..…….**53 - 54**
MTH 251 Calculus I ……...**5**
MTH 252 Calculus II……...**5**
MTH 253 Calculus III: Sequences and Series ……...**3**
MTH 254 Calculus IV: Multivariate Calculus ……...**5**
MTH 280 Introduction to Proofs……..……...**4**
MTH 341 Linear Algebra ……..……..……...**4**
MTH 344 Group Theory ……**4**
MTH 355 Discrete Mathematics ……**4**
MTH 365 Mathematical Probability...……..……...**4**
MTH 366 Mathematical Statistics..…… ……...**4**
Choose 3 Electives from ……. ……...…….…… **11 - 12**

- MTH 311 Advanced Calculus (4)
- MTH 314 Differential Equations I (4)
- MTH 345 Ring Theory (4)
- MTH 346 Number Theory (4)
- MTH 351 Introduction to Numerical Analysis (4)
- MTH 358 Mathematical Modeling (4)
- MTH 420 Advanced Topics: Applied Math (3)
- MTH 441 Linear Algebra II (4)
- MTH 451 Numerical Analysis (4)
- MTH 460 Advanced Topics: Probability and Statistics (3)

COMPUTER SCIENCE CORE COURSES ……...……...… …… **53**
CS 160 Survey of Computer Science ……..**3**
CS 161 Computer Science I ……**5**
CS 162 Computer Science II ……...……**5**
CS 260 Data Structures I ……**3**
CS 262 Programming Languages ……...**2**
CS 271 Computer Organization ……..**4**
CS 311 Data Structures II ……...**3**
CS 315 Theory of Programming Languages ……..**3**
CS 345 Theory of Computation I ……...**3**
CS 372 Operation Systems ……**3**
CS 420 Data Management Systems ……....**3**
CS 425 System Analysis & Design ……**3**
CS 430 Software Implementation & Testing ……..….**3**
CS 406 Senior Seminar ……...**1**
Choose three from one of the following elective sequences ……..….**9**
A. Computational Theory

- CS 440 Analysis of Algorithms (3)
- CS 445 Theory of Computation (3)
- CS 447 Compiler Design (3)
- CS 449 Topics in Computational Theory (3)

B**.** Software Engineering

- CS 470 Operating Systems-Advanced Topics (3)
- CS 471 Metrics and Testing (3)
- CS 473 Human Machine Interfaces (3)

CS 474 Current Systems (3)
CS 475 Applied Computational Intelligence (3)
CS 479 Topics in Software Engineering (3)

C. Systems Management

CS 450 Network Fundamentals (3)
CS 451 Management of Information Systems (3)
CS 452 Internet Communications (3)
CS 453 Data Mining and Data Warehousing (3)
CS 459 Topics in Systems Management (3)

CURRENT Degree Plans

		Math Major	
	FALL	**WINTER**	**SPRING**
Fr	MTH 251	MTH 252	MTH 253, MTH 280
So	MTH 254, MTH 341	MTH 365, Math Elec	MTH 366, Math Elec
Jr	Math Elec, CS 161	MTH 344, MTH 4x0	MTH 345, Math Elec
Sr	MTH 311, Math Elec	MTH 312, MTH 403	MTH 403, Math Elec

Fr	MTH 111	MTH 112	MTH 251
So	MTH 252	MTH 253, CS 161	MTH 254, MTH 280
Jr	MTH 341, Math Elec	MTH 344, MTH 365, MTH 4X0	MTH 345, MTH 366, Math Elec
Sr	MTH 311, Math Elec, Math Elec	MTH 312, Math Elec, MTH 403	MTH 403, Math Elec

		Math Education Major	
Fr	MTH 251	MTH 252	MTH 253, MTH 280
So	MTH 254, MTH 341, MTH 346/MTH 338	MTH 355, MTH 365	MTH 366, Math Elec/MTH 337, Math Elec
Jr	MTH 311, MTH 346 / Math Elec	Math Elec, MTH 344, CS 161	MTH 345, Math Elec, Education Courses
Sr	Education Courses	Education Courses	Education Courses

Fr	MTH 111	MTH 112	MTH 251 (MTH 252 SUMMER)
So	MTH 254, MTH 341, Math Elec	MTH 253, MTH 365, CS 161	MTH 280, MTH 366
Jr	MTH 346/MTH 311, Math Elec/MTH 338	MTH 344, MTH 355, Math Elec	MTH 345, MTH 337/Math Elec, Math Elec
Sr	MTH 311 / MTH 346, Educ Courses	Education Courses	Education Courses

B) Describe the reasons for making this change.

See above.

C) How and when will the effectiveness of these changes be determined?

Expected Outcomes from Mathematics Program Changes

The proposed changes are not designed with new outcomes in mind. Rather, the changes are in support of the outcomes developed in anticipation of the accreditation process for WOU, which are

1. Problem Solving Skills – the ability to analyze complicated problems in a variety of subject areas, and to synthesize solutions to such problems.
2. Modeling Skills – the ability to translate various real-world scenarios into mathematical models.
3. Technological Skills – the ability to properly determine and effectively use computing tools and other technologies to solve problems and support conjectures.
4. Skilled use of Methods of Proof – the ability to make rigorous mathematical arguments including how to both prove and disprove conjectures. Including working with axiomatic systems – the ability to determine if given examples satisfy the given axioms and the ability to demonstrate logical consequences of those axioms.
5. Communication Skills – the ability to precisely articulate (both in writing and orally) complicated and technical arguments. These can be both mathematical and logical.
6. Subject Awareness – an awareness of the distinction between applied and theoretical mathematics, an appreciation of the connection between the two fields, and a reasonable perception of the breadth of each field.
7. Career Awareness – an awareness of the career and educational opportunities for mathematics majors; this many include internship and undergraduate research experiences.

The body of the proposal submitted to the Curriculum Committee indicates why we think the proposed outcomes will help us achieve these outcomes. See item 5 in responses to A and B above. Moreover, the new applied mathematics track (item 6 above) is specifically directed at outcome number 6.

Assessment

Our proposal sketched a plan for tracking success (item 7 above). It was a summary of some of the relevant parts of the assessment plan contained in our 2007 departmental self-study, which appears on the following pages. We will have at least two years of data before the proposed changes take place. We will compare with data after the change both to see if the outcomes are being met and if they are being met more fully as a result of the changes.

Assessment Method	Math Knowledge	Problem Solving	Modeling	Technology	Methods of Proof	Commun-ication	Subject Awareness	Career Awareness
Standardized Exit Exam (ETS Major Field Test, PRAXIS, or GRE Math Subject Area)	X							
Final Exams on File for 311 & 312 Advanced Calc I & II, 344 & 345 Group & Ring Theory	X	X			X			
Senior Project Videotape		X			X	X		
Senior Project Papers on File		X			X	X		
Essays from Writing Intensive Courses – 280 Intro to Proof, 337 Geometry and 472 History of Math						X		
Conference / Academic Excellence Day Presentations - Abstracts/PowerPoint files		X				X		
Projects - Problem Solving Using Technology - from Calculus, 314 DE, 351 Numerical Analysis, 363 Linear Programming, 366 Math. Statistics	X		X	X				

(continued on the next page)

Assessment Method	Math Knowledge	Problem Solving	Modeling	Technology	Methods of Proof	Commun-ication	Subject Awareness	Career Awareness
Projects - Problem Solving Using Technology - from 337 Geometry	X			X				
Exit Interviews							X	X
Alumni Surveys								X

LAS Embedded Assessment Action Report For *Program Review*

Degree Program(s): Mathematics Support for EC/ELEM, ELEM/MS Education majors

(**BA, BS,** BFA, MA, MS, LACC, etc.)

Course # / Title: Math 213

Faculty name: Mathematics: C. Beaver, Burton

Date: Spring Term 2008

A) State the program **learning outcome** or **general education goal** this assessment is linked to:

Students will demonstrate:
Problem Solving and Problem Writing Skills - the ability to create and understand complicated situations, which are applications of K-8 mathematical topics and to apply learned skills and techniques to resolve them.

Ability to Model Problems – the ability to translate various real–world scenarios into mathematical models that can be explored by hands-on models, paper-and-pencil methods and technological applications where appropriate.

Communication Skills - Ability to precisely articulate (both in writing and orally) K – 8 mathematical topics in a way that is clear and understandable to elementary and middle school students.

Effective Classroom Management - Appreciation of a variety of pedagogical approaches and knowledge of an assortment of presentation and classroom working environments to effectively support the learning of mathematics for students with diverse learning styles.

B) Check the embedded assessment tool(s) used:

X☐ Exam question
X☐ Essay/IN TERMS OF PROBLEM AND LESSON WRITING
X☐ Oral presentation/ IN TERMS OF SHARING WORK IN FRONT OF CLASS AND LESSON PLAN PRESENTATIONS
☐ Thesis
☐ Portfolios
☐ Practicum / Service Learning
☐ Capstone paper / project
☐ Other ___

Attach a copy of the actual question / assignment as it is presented to the student or a description of the embedded process.
See the next page

Please submit a copy of this action report to the LAS dean's office.

Math 213; essay type homework question

For each of the following; use any combination of Pattern Blocks (cardstock or virtual) to form the figure with the stated properties; but do not duplicate any figures formed in this activity set. Sketch or print your work.

a. Figure a: One line of symmetry and no rotational symmetries (other than 360°).
b. Figure b: Six rotational symmetries but no lines of symmetry
c. Figure c: Three rotational symmetries and three lines of symmetry
d. Figure d: No rotational symmetries (other than 360°) and no lines of symmetry.

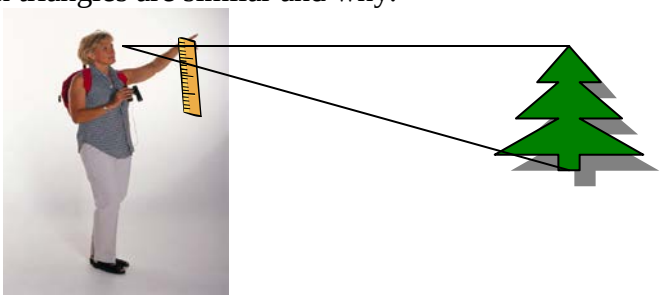
Math 213; class presentation assessment task

Scavenger Hunt

You will draw a topic the first week of class; your task is to find two references to this topic in two different mathematics textbooks for children. Bring copies class to share. Towards the beginning of class you will be asked to share what you have found with the class—you will be asked to project up the pages and briefly discuss how they relate to the topic and to our class

Math 213; exam question

At the end of a long hike in the mountains, Josie can spot her car parked in the distance. She wonders how far she is from her car. She can see the tree she parked next to which she recalls is 20 feet tall. Josie remembers that she learned something about similar triangles in her Math 213 class that will help her figure out the distance to the tree -- all she needs is a ruler, which of course she brings with her everywhere she goes. Josie stands up straight, pulls out her ruler and finds she can line up her eye with the top of the ruler and the tree. She observes the bottom of the tree lines up with the 6 inch mark on her ruler. She measures and finds that the distance from her eye to the top of the ruler is 21 inches. How far is Josie from the tree? Explain. Include in your explanation which triangles are similar and why.



LAS Embedded Assessment Action Report For *Program Review*

Degree Program(s): Mathematics Support for EC/ELEM, ELEM/MS Education majors

(**BA, BS,** BFA, MA, MS, LACC, etc.)

Course # / Title: Math 394

Faculty name: Mathematics: Burton

Date: Spring Term 2008

A) State the program **learning outcome** or **general education goal** this assessment is linked to:

Students will demonstrate:
Problem Solving and Problem Writing Skills - the ability to create and understand complicated situations, which are applications of K-8 mathematical topics and to apply learned skills and techniques to resolve them.

Ability to Model Problems – the ability to translate various real–world scenarios into mathematical models that can be explored by hands-on models, paper-and-pencil methods and technological applications where appropriate.

Communication Skills - Ability to precisely articulate (both in writing and orally) K – 8 mathematical topics in a way that is clear and understandable to elementary and middle school students.

Effective Classroom Management - Appreciation of a variety of pedagogical approaches and knowledge of an assortment of presentation and classroom working environments to effectively support the learning of mathematics for students with diverse learning styles.

B) Check the embedded assessment tool(s) used:

X☐ Exam question
X☐ Essay/IN TERMS OF PROBLEM AND LESSON WRITING
X☐ Oral presentation/ IN TERMS OF SHARING WORK IN FRONT OF CLASS AND LESSON PLAN PRESENTATIONS
☐ Thesis
☐ Portfolios
☐ Practicum / Service Learning
☐ Capstone paper / project
☐ Other ___

Attach a copy of the actual question / assignment as it is presented to the student or a description of the embedded process.
See the next page

Please submit a copy of this action report to the LAS dean's office.

Math 394: Lesson Plan Project

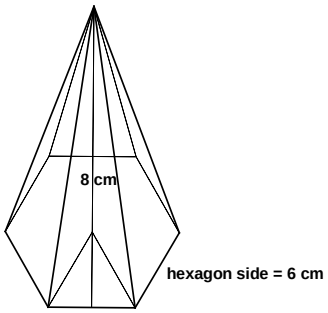
A. Written Paper: Formal lesson plan for school children on a geometric topic with at least one activity for school children. Read and use at least the following resources:
   - ✓ Two state adopted K – 8 textbooks; two different grade levels.
   - ✓ One article, preferably from the NCTM's *Teaching Children Mathematics.* The NCTM's *Mathematics Teaching in the Middle School* journal is also acceptable.
   - ✓ The NCTM Standards or Standards Summary

B. Presentation: Prepare a PowerPoint presentation to share with the class. Your formal presentation should be an outline of all of the ideas in your written paper. Briefly share the *Activity Portion* of your *Written Paper* with the class by having the class work through the activity—as it is designed for children.

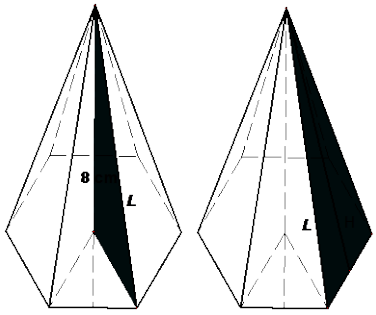
Math 394: Exam Question

The following right regular hexagonal pyramid has the following measurements:
Length of side of hexagonal base: 6 cm Height of the pyramid: 8 cm.

What is the volume of the pyramid? Carefully show your work.



What is the surface area of the pyramid? Hint: Use the 8 cm height to find L and then use L to find the height, H, of the triangular faces. Carefully show your work.



Math 394: Hands On Cooperative Learning Activity

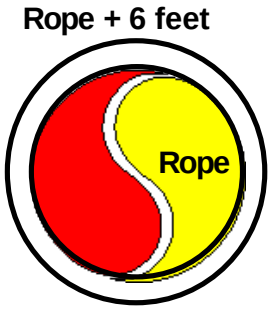
Next page

§3.1 An ant, a snake, a rabbit, a dog, a horse or an elephant? Math 394

Purpose: Determine the distance between the diameter of two concentric circles

Here is the main question we wish to investigate:

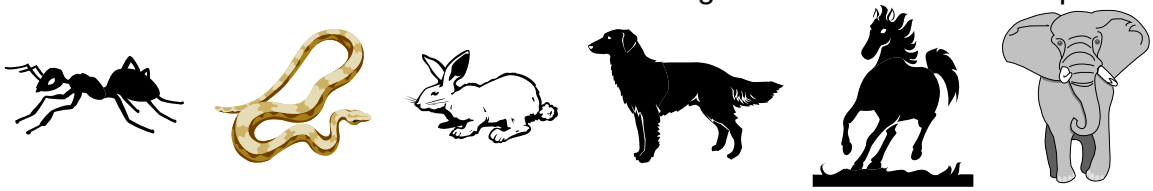
A rope is tied around any *Circular Object A* and then 6 feet is added to the rope.



Which animal can now walk between the rope and *Circular Object A?* The initial rope varies in length depending on the original circular object.

(animal sketches not to scale)

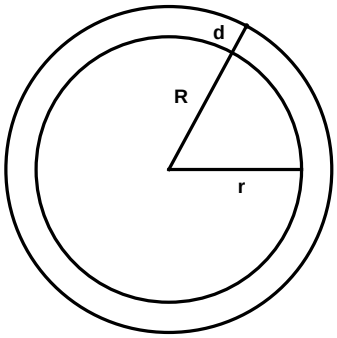
Ant Snake Rabbit Dog Horse Elephant



1. What if *Circular Object A* is a ping pong ball?
2. What if *Circular Object A* is a basketball?
3. What if *Circular Object A* is a 3 foot diameter workout ball?
4. What if *Circular Object A* is an above ground circular pool 20 feet across?
5. What if *Circular Object A* is the earth? The radius of the earth is approximately 3960 miles.

ACTIVITY

Materials
String
Measuring tapes
Circular objects



R: radius of larger circle
r: radius of smaller circle
d = distance between two circles = R - r

Use string and physically measure the distance, d between the circular object and the rope with six feet added for each of the round object provided in class.

Record your solutions.

Follow Up
Measure the length of each string and use this circumference to determine the actual measures of r and R (as appropriate) for the circular objects you are measuring. Compute R – r = d in each case.

Natural Science & Mathematics 2007-2008 Annual Faculty Activity Report

Due Date: July 15, 2008
Please send electronic copies as email attachments to Steve Taylor, taylors@wou.edu

Note: template updated June 9, 2008 by Steve Taylor to include Dean Scheck's recent call for increased assessment activities and public- relations outreach in the college of LAS. This template is identical to that distributed by Lonnie on May 8, 2008; with two new sections added "VI. Program Assessment Activities" and "VIII. Public Relations and Promotional Highlights". In addition to promotion and tenure, individual faculty reports will form the basis of the annual departmental and division reports. Your assistance in this endeavor is greatly appreciated.

Name: Hamid Behmard **Date: 7/21/2008**

I. Classroom Teaching

List the courses that you have taught this year.

Indicate any courses that were new preparations, significantly revised preparations or writing intensive and anything significant about your efforts in these courses. Describe any new techniques or materials you have incorporated into your classroom teaching.
Fall: MTH 341 (Linear Algebra) New textbook, new prep, MTH 254 (Multivariate Calculus), MTH 111 (College Algebra) new prep, new pedagogy, new book and new approach for department.

Winter: MTH 355 (Discrete Mathematics), MTH 403 (Senior Project) capstone course for math seniors, MTH 252 (Integral Calculus)

Spring: MTH 314 (Differential Equations I), MTH 403 (Senior Project) capstone course for math seniors, MTH 112 (Elementary Functions) new prep, new pedagogy, new book and new approach for department.

Summarize any field trips that you conducted. None.

II. Research & Scholarship

Describe any research projects you have worked on this year. Indicate any student involvement or collaborations in these projects.
I supervised the senior project course with 9 students. Among these the paper by Meghann Barger was accepted to be presented at the annual AMS/MAA MathFest meeting as part of the

Pi Mu Epsilon session in July of 2008.

Grant Writing Activities:

Title	Authors	Funding Source	Amount	Funded?

Publications: I have submitted a paper to the IEEE Transactions on Signal Processing for review. The title of the paper is "Efficient Reconstruction Algorithms Using Shifted Lattices".

Presentations: I have presented at the SIAM (Society for Industrial and Applied Mathematics) conference on Imaging Science in July 2008 at San Diego. The title of the talk was "An Efficient Reconstruction Method for Band-Limited Images Using Nonperiodic Sampling Sets)

III. Professional Service

List any professional service you have done this year (including memberships in professional organizations and consulting activities.)
Member of IEEE (Institute of Electrical and Electronics Engineers)
Refereed one paper for the IEEE Transactions on Signal Processing and in the process of refereeing a second paper for the same journal.

Member of SIAM (Society for Industrial and Applied Mathematics)

IV. Institutional Service

Describe departmental duties you have carried out (i.e., scheduling, recruiting activities, search committees, etc)

I have served on the Faculty Development Committee.

I have been CO-Chair of the mathematics department over the last year. As part of my duties, I have supervised the expenditures and the budget of the department. I have conducted the search for two part-time instructors and successfully employed them. I have facilitated students' complaint procedures. I have supervised the scheduling (and rescheduling) of the department classes.

I have also been in charge of all affairs related to the remedial math courses (MTH 70, 95) and MTH 105, 111, and 112. These duties include assessment of the transfer courses, challenge tests, etc.

I have attended Preview Day and Early Bird Registration as the department representative.

List any divisional service you have done. Include any committee work (what committee & your role with that committee), recruiting programs (SOAR, early bird, etc), student clubs, etc.

I have served as the chair of the NSM – PRC.

V. Academic Advising

Describe what you have done in the last year in terms of academic advising (number of advisees, programs in which you advise, etc).

I have advised 10 major/minor students in math and secondary math.

VI. Program Assessment Activities

List and describe program assessment activities that you have been involved with in the past year (e.g. embedded assessment activities, exit exams, assessment planning, assessment-based curriculum changes, related professional development, etc.).

I have supervised the Senior Project (MTH 403) last year. This course includes writing a capstone paper, which in most cases would be an expository paper based on a published mathematics paper. The students in this course also present their papers in a two one hour lectures to their fellow classmates and the rest of the department. Many of our sophomores and juniors and faculty attend these presentations. These presentations are video taped and archived as part of the mathematics department assessment plan. They also present a summary of their paper at the Academic Excellence Showcase. Our graduating seniors also complete an exit interview and a Major Field Test in mathematics. Please, see the Appendix for copies of the rubric for senior paper and presentations. There you will also find copies of the exit interview.

Our department has an assessment plan in place. I carry out parts of the plan relevant to my department teaching and assignments (archiving samples of student writing and exams, conducting exit interviews, etc.)

Embedded assessment activities are described in the Appendix.

VII. Miscellaneous (Any other items not covered above)

VIII. Public Relations and Promotional Highlights

The dean is taking actions to increase PR and promotion of LAS. From your above summary, list the highlights of your faculty scholarship, student scholarship and service-related activities that you would like to see prominently promoted on the university web site, in news media, campus brochures, newsletters, and other public-relations materials. Provide a short blurb for each item with any recommendations on how you would like news of your work disseminated.

LAS
Embedded Assessment Action Report

For

Program Review

Degree Program(s): BS Mathematics

Course # / Title: MTH 314 Differential Equations I

Faculty name: Hamid Behmard

Date: 7/21/08

A) State the program **learning outcome** or **general education goal** this assessment is linked to:

(MK) Mathematical Knowledge – demonstrate mastery of a body of mathematics

(PS) Problem Solving Skills – the ability to analyze complicated problems in a variety of subjects areas, and to synthesize solutions to such problems

B) Check the embedded assessment tool(s) used :

X Exam question
□ Essay
□ Oral presentation
□ Thesis
□ Portfolios
□ Practicum / Service Learning
□ Capstone paper / project
□ Other _____

Attach a copy of the actual question / assignment as it is presented to the student or a description of the embedded process.

Please submit a copy of this action report to the LAS dean's office.

(13 pts.) 2. Determine whether the given differential equation is exact. If it is exact, find the solution.

$$(2xy^2 + 3x^2)dx + (2x^2y + 4y^3)dy = 0$$

(13 pts.) 6. Find the solution of the given IVP.

$$y'' + 4y = t^2 + 3e^t, \qquad y(0) = 0, \quad y'(0) = 2$$

(15 pts.) 7. A mass weighing 8 lb stretches a spring 1 in. The mass is attached to a viscous damper with a damping constant of 1.5 lb-sec/ft. If the mass is set in motion from its equilibrium position with an upward velocity of 4 in./sec, find its position ıu at any time t. Plot u versus t. Determine when the mass first returns to its equilibrium position. Also find the time τ such that $|u(t)| < 0.01$ in. for all $t > \tau$.

LAS
Embedded Assessment Action Report

For

Program Review

Degree Program(s): BS Mathematics

Course # / Title: MTH 403 Senior Project

Faculty name: Hamid Behmard

Date: 7/21/08

A) State the program **learning outcome** or **general education goal** this assessment is linked to:

(MK) Mathematical Knowledge
(PS) Problem Solving Skills
(TS) Technology Skills
(SMP) Skilled use of Method of Proofs
(CS) Communication Skills

B) Check the embedded assessment tool(s) used :

- ☐ Exam question
- ☐ Essay
- X Oral presentation
- ☐ Thesis
- ☐ Portfolios
- ☐ Practicum / Service Learning
- X Capstone paper / project
- X Exit Interviews and Major Field Test (ETS) in mathematics

Attach a copy of the actual question / assignment as it is presented to the student or a description of the embedded process.

Please submit a copy of this action report to the LAS dean's office.

RUBRIC FOR SENIOR PROJECT PAPER SPRING 2008

	Criteria (from syllabus)	Not met 1	Largely met 2	Fully met 3	Exceed 4	Wt.	Total
Mathematics	Appropriate depth & sophistication; significant mathematical content; shows the sophistication expected of an upper division math student					2	
	Correctness: definitions, theorems, proofs correct				N/A	2	
	Clarity: definitions, theorems, proofs clear					2	
Originality	Original collection of related materials, includes original examples or special cases (when possible), not overly bound to the style of the source.					2	
Drafts	Incorporated draft feedback				N/A	2	
Mechanics							
Formatting	AMM style; typed; 1.5 spacing				N/A	1	
Bibliography	Sources in AMM style; citations in one of the two styles on the Guidelines.				N/A	1	
Grammar & Writing	Good sentence structure; easily understood and mature writing style; generally correct spelling, grammar and punctuation ; smooth transitions					2	
Organization	Clear and focused message; logical progression of ideas				N/A	2	
Audience	Accessible to an average senior mathematics major at WOU				N/A	2	
TOTAL	(fully meeting all categories ~87% or B+)						/62

2008 WOU Senior Project Oral Presentation Scoring Guide

Presenter: _____ Topic: _____ Evaluator: _____

Give an evaluation for each criterion[1] and an overall evaluation. HP = High Pass, P = Pass, N = No Pass
Summary data may be shared with the presenter, but individual evaluators will not be identified.

Evaluation Criteria	**High Pass Descriptors**	**Pass Descriptors**	**No Pass Descriptors**	**Evaluation**
Presentation shows the mathematical sophistication expected of a graduating senior.	Significant use of advanced mathematics.	Some use of advanced mathematics.	Little use of advanced mathematics.	
Shows understanding of the topic.	Shows thorough understanding of the topic.	Shows good understanding of the topic.	Shows poor understanding of the topic.	
Relevant concept definitions are clearly presented using proper notation.	Concept definitions stated and written clearly and correctly.	Concept definitions mostly stated and written clearly and correctly.	Concept definitions flawed or were not written.	
Relevant concept images are clearly conveyed.	Clear examples or analogies are given to convey the concept images.	Some attempt was made to convey the concept images.	Little attempt to convey the concept images.	
Included significant proofs.	Significant proofs were presented clearly and correctly.	Significant proofs were given, but were rough or had minor flaws.	Proofs were poorly done, incorrect, trivial or missing.	
Presentation shows good organization, pacing and advance preparation.	Presentation was well-organized, properly paced and appears to have been rehearsed.	Presentation had some small flaws in organization or timing, but appeared to have been rehearsed.	Presentation had major flaws in organization or timing.	
Presentation is creative and shows independence of thought.	Creatively presented in the speaker's own style.	Some creativity, but seemed somewhat bound to the style of the source materials.	Little creativity. Seemed to be simply reproducing what was in the source material.	

Overall Evaluation[2]: HP P N **Comments:**

[1] Based on the descriptors as stated, not on your own opinion.
[2] Based on the evaluator's own judgment, which can include factors not listed in the criteria.

Some things to remember:

- Pay attention to the criteria in the scoring guide.
- Write more on the board than you think you should. You can speak much faster than the audience can process and absorb what you are saying. Writing helps to control the pace, besides allowing the audience to refer back to a definition or theorem.
- Use handouts if you wish. They can be copied by the math department.
- Rehearse, rehearse. That is the only way to ensure that you have the proper amount of material.
- Think of ways to involve the audience in active learning.

WESTERN OREGON UNIVERSITY
MATHEMATICS DEPARTMENT EXIT INTERVIEW

Directions:
(1) Save this document in the Exit Interviews folder on the M drive using the name
<year> exit interview <number> where <number> is the next unused positive integer
e.g.,.2007 exit interview 3
(2) Go through the questions and type the student's responses. The student may remain anonymous.

Interviewer:
What led you to become a mathematics major?

What do you hope to do after graduation?

Did you know about or participate in these activities: (delete those that do not apply)

1. **giving a math talk outside class:** KnewAbout Participated
2. **Math Club math talks:** KnewAbout Participated
3. **Math Club career/grad school talks** KnewAbout Participated
4. **COMAP modeling competition:** KnewAbout Participated
5. **attending a math talk not at WOU:** KnewAbout Participated
6. **mathematics conferences:** KnewAbout Participated
7. **an REU or summer math program:** KnewAbout Participated
8. **internships or practica** KnewAbout Participated
9. **tutoring, paper grading, course TA** KnewAbout Participated

If you participated, were those valuable experiences? If not, why not?

What did you like and/or dislike about your experience as a mathematics major?

Were you advised well within the Mathematics Department, both academically and for your career path?

When comparing your experiences as a mathematics major with that of friends with other majors, have you heard of things that other departments do that you wish we did?

When comparing your experiences as a mathematics major with that of friends with other majors, are there things that we do that your friends wish their major's department would do?

Anything else you would like to add?

LAS
Embedded Assessment Action Report

For

Program Review

Degree Program(s): BS Mathematics

Course # / Title: MTH 314 Differential Equations I

Faculty name: Hamid Behmard

Date: 7/21/08

A) State the program **learning outcome** or **general education goal** this assessment is linked to:

(MK) Mathematical Knowledge – demonstrate mastery of a body of mathematics

(PS) Problem Solving Skills – the ability to analyze complicated problems in a variety of subjects areas, and to synthesize solutions to such problems

B) Check the embedded assessment tool(s) used :

X Exam question
□ Essay
□ Oral presentation
□ Thesis
□ Portfolios
□ Practicum / Service Learning
□ Capstone paper / project
□ Other _____

Attach a copy of the actual question / assignment as it is presented to the student or a description of the embedded process.

Please submit a copy of this action report to the LAS dean's office.

(13 pts.) 2. Determine whether the given differential equation is exact. If it is exact, find the solution.

$$(2xy^2 + 3x^2)dx + (2x^2y + 4y^3)dy = 0$$

(13 pts.) 6. Find the solution of the given IVP.

$$y'' + 4y = t^2 + 3e^t, \qquad y(0) = 0, \quad y'(0) = 2$$

(15 pts.) 7. A mass weighing 8 lb stretches a spring 1 in. The mass is attached to a viscous damper with a damping constant of 1.5 lb-sec/ft. If the mass is set in motion from its equilibrium position with an upward velocity of 4 in./sec, find its position ıu at any time t. Plot u versus t. Determine when the mass first returns to its equilibrium position. Also find the time τ such that $|u(t)| < 0.01$ in. for all $t > \tau$.

LAS
Embedded Assessment Action Report

For

Program Review

Degree Program(s): BS Mathematics

Course # / Title: MTH 403 Senior Project

Faculty name: Hamid Behmard

Date: 7/21/08

A) State the program **learning outcome** or **general education goal** this assessment is linked to:

(MK) Mathematical Knowledge
(PS) Problem Solving Skills
(TS) Technology Skills
(SMP) Skilled use of Method of Proofs
(CS) Communication Skills

B) Check the embedded assessment tool(s) used :

- ☐ Exam question
- ☐ Essay
- X Oral presentation
- ☐ Thesis
- ☐ Portfolios
- ☐ Practicum / Service Learning
- X Capstone paper / project
- X Exit Interviews and Major Field Test (ETS) in mathematics

Attach a copy of the actual question / assignment as it is presented to the student or a description of the embedded process.

Please submit a copy of this action report to the LAS dean's office.

RUBRIC FOR SENIOR PROJECT PAPER SPRING 2008

	Criteria (from syllabus)	Not met 1	Largely met 2	Fully met 3	Exceed 4	Wt.	Total
Mathematics	Appropriate depth & sophistication; significant mathematical content; shows the sophistication expected of an upper division math student					2	
	Correctness: definitions, theorems, proofs correct				N/A	2	
	Clarity: definitions, theorems, proofs clear					2	
Originality	Original collection of related materials, includes original examples or special cases (when possible), not overly bound to the style of the source.					2	
Drafts	Incorporated draft feedback				N/A	2	
Mechanics							
Formatting	AMM style; typed; 1.5 spacing				N/A	1	
Bibliography	Sources in AMM style; citations in one of the two styles on the Guidelines.				N/A	1	
Grammar & Writing	Good sentence structure; easily understood and mature writing style; generally correct spelling, grammar and punctuation ; smooth transitions					2	
Organization	Clear and focused message; logical progression of ideas				N/A	2	
Audience	Accessible to an average senior mathematics major at WOU				N/A	2	
TOTAL	(fully meeting all categories ~87% or B+)						/62

2008 WOU Senior Project Oral Presentation Scoring Guide

Presenter: _____ Topic: _____ Evaluator: _____

Give an evaluation for each criterion[1] and an overall evaluation. HP = High Pass, P = Pass, N = No Pass
Summary data may be shared with the presenter, but individual evaluators will not be identified.

Evaluation Criteria	**High Pass Descriptors**	**Pass Descriptors**	**No Pass Descriptors**	**Evaluation**
Presentation shows the mathematical sophistication expected of a graduating senior.	Significant use of advanced mathematics.	Some use of advanced mathematics.	Little use of advanced mathematics.	
Shows understanding of the topic.	Shows thorough understanding of the topic.	Shows good understanding of the topic.	Shows poor understanding of the topic.	
Relevant concept definitions are clearly presented using proper notation.	Concept definitions stated and written clearly and correctly.	Concept definitions mostly stated and written clearly and correctly.	Concept definitions flawed or were not written.	
Relevant concept images are clearly conveyed.	Clear examples or analogies are given to convey the concept images.	Some attempt was made to convey the concept images.	Little attempt to convey the concept images.	
Included significant proofs.	Significant proofs were presented clearly and correctly.	Significant proofs were given, but were rough or had minor flaws.	Proofs were poorly done, incorrect, trivial or missing.	
Presentation shows good organization, pacing and advance preparation.	Presentation was well-organized, properly paced and appears to have been rehearsed.	Presentation had some small flaws in organization or timing, but appeared to have been rehearsed.	Presentation had major flaws in organization or timing.	
Presentation is creative and shows independence of thought.	Creatively presented in the speaker's own style.	Some creativity, but seemed somewhat bound to the style of the source materials.	Little creativity. Seemed to be simply reproducing what was in the source material.	

Overall Evaluation[2]: HP P N **Comments:**

[1] Based on the descriptors as stated, not on your own opinion.
[2] Based on the evaluator's own judgment, which can include factors not listed in the criteria.

Some things to remember:

- Pay attention to the criteria in the scoring guide.
- Write more on the board than you think you should. You can speak much faster than the audience can process and absorb what you are saying. Writing helps to control the pace, besides allowing the audience to refer back to a definition or theorem.
- Use handouts if you wish. They can be copied by the math department.
- Rehearse, rehearse. That is the only way to ensure that you have the proper amount of material.
- Think of ways to involve the audience in active learning.

WESTERN OREGON UNIVERSITY
MATHEMATICS DEPARTMENT EXIT INTERVIEW

Directions:
(1) Save this document in the Exit Interviews folder on the M drive using the name
<year> exit interview <number> where <number> is the next unused positive integer
e.g.,.2007 exit interview 3
(2) Go through the questions and type the student's responses. The student may remain anonymous.

Interviewer:
What led you to become a mathematics major?

What do you hope to do after graduation?

Did you know about or participate in these activities: (delete those that do not apply)

1. **giving a math talk outside class:** KnewAbout Participated
2. **Math Club math talks:** KnewAbout Participated
3. **Math Club career/grad school talks** KnewAbout Participated
4. **COMAP modeling competition:** KnewAbout Participated
5. **attending a math talk not at WOU:** KnewAbout Participated
6. **mathematics conferences:** KnewAbout Participated
7. **an REU or summer math program:** KnewAbout Participated
8. **internships or practica** KnewAbout Participated
9. **tutoring, paper grading, course TA** KnewAbout Participated

If you participated, were those valuable experiences? If not, why not?

What did you like and/or dislike about your experience as a mathematics major?

Were you advised well within the Mathematics Department, both academically and for your career path?

When comparing your experiences as a mathematics major with that of friends with other majors, have you heard of things that other departments do that you wish we did?

When comparing your experiences as a mathematics major with that of friends with other majors, are there things that we do that your friends wish their major's department would do?

Anything else you would like to add?

LAS
Embedded Assessment Action Report

For

Program Review

Degree Program(s): BS Mathematics Major Elective Course

(BA, BS, BFA, MA, MS, LACC, etc.)

Course # / Title: Math 440: Advanced Topics: Algebra

Faculty name: Cheryl Beaver

Date: June 7, 2008

A) State the program **learning outcome** or **general education goal** this assessment is linked to:

- Communication Skills – the ability to precisely articulate (both in writing and orally) complicated and technical arguments. These can be both mathematical and logical.
- Subject Awareness – an awareness of the distinction between applied and theoretical mathematics, an appreciation of the connection between the two fields, and a reasonable perception of the breadth of each field.

B) Check the embedded assessment tool(s) used :

☐ Exam question
☐ Essay
x Oral presentation
☐ Thesis
☐ Portfolios
☐ Practicum / Service Learning
☐ Capstone paper / project
x Other Paper

Attach a copy of the actual question / assignment as it is presented to the student or a description of the embedded process.

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Math 440 Project and Presentation

This was an advanced topics course in algebra with a focus on the field of Cryptology. This project was designed to have the students investigate how the mathematics of Cryptology has been applied to important and practical applications in the real world.

Math 440 Project Step 1: Choose a Topic

Directions: Identify your top 3 choices for your project topic. You may choose from the list below or propose your own topic. You will be required to write a paper and give a 20 minute presentation on your topic. If you wish you may choose a partner. Both people must agree to work with each other. If you have a partner, your presentation must be 40 minutes long and your paper will have additional requirements as well (to be outlined in later instructions).

Due: Topic choices are due on Monday. I will assign topics after I review your choices.

1. Micropayments (Peppercoin -Rivest)
2. Cryptography in WWII
3. Secret Sharing
    a. Group signatures
    b. Distributed Data Storage
4. Cryptography on the Internet/ Transport Layer Security (TLS)
5. Secure Voting (Rivest)
6. Key-escrow / Clipper Chip and Capstone Chip
7. Advanced Encryption Standard (AES)
8. Data Encryption Standard (DES)
9. Audit control / e.g. Tripwire
10. Public Key Infrastructure (PKI)
11. Pretty Good Privacy (PGP)
12. Copyright control/content control –
    a. Digital Millennium Copyright Act (DMCA)
    b. Pay-Per-View/other
13. Hash Collisions (and digital signatures)
14. Zero-knowledge proofs
15. Radar tags (RFID)
16. Bluetooth
17. Stream ciphers – LFSR & polynomials
18. Biometrics

Milestone	Description	Due Date	Points
Outline	Brief Outline of main topics	5/5	10
Pre-Presentation	Email Cheryl slides for presentation and have a meeting with Cheryl about presentation	At least 2 days before your presentation	20
Presentation	Electronic (Power Point or Beamer) presentation (alternate presentation method by request). Length for single presenter: 20 minutes with 5 minutes for questions. Length for two presenters: 40 minutes with 5 minutes for questions. See Student Presentation Scoring Guide and Rubric for scoring information.	Various	100
Paper	Paper must be at least 5 pages long (for single author) or 10 pages (for 2 authors) NOT including references, pictures, or algorithm descriptions. Paper will be graded based on 1. Content 2. Clarity and Organization 3. Mechanics (grammar, spelling, punctuation, proper citations, length, etc.) ** Draft due on Friday May 30th	Monday June 9, 2008	140
Attendance	You are required to attend all presentations. There will be presentations during your scheduled final exam time of 12-2 on Monday June 9th. You will loose 2 points for each *person* whose presentation you miss.	Various	30
Total			300

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Embedded Assessment Action Report
For
Program Review

Degree Program(s): __BS Graduate Requirement_____
(BA, BS, BFA, MA, MS, LACC, etc.)

Course # / Title: _MTH 111 College Algebra_____

Faculty name: __Laurie Burton, Klay Kruczek, Mike Ward_____

Date: _____June 16, 2008_____

A) State the program **learning outcome** or **general education goal** this assessment is linked to:

- Problem Solving Skills – the ability to analyze complicated problems in a variety of subject areas, and to synthesize solutions to such problems.
- Modeling Skills – the ability to translate various real-world scenarios into mathematical models.

B) Check the embedded assessment tool(s) used :

☒ Exam question
☐ Essay
☐ Oral presentation
☐ Thesis
☐ Portfolios
☐ Practicum / Service Learning
☐ Capstone paper / project
☐ Other _____

Attach a copy of the actual question / assignment as it is presented to the student or a description of the embedded process.

Please submit a copy of this action report to the LAS dean's office.

Final Exam Questions:

1. Suppose one of your classmates purchases shares of stock for IBM. Suppose the price of one share after one week was $102. The price for a share of IBM drops after 3 weeks to $98. Let *P* be the value of one share of IBM stock and *t* represents the time in weeks since your classmate purchased the stock (leave the weeks as given. Don't change week 1 to week zero).

   Find an exponential model for *P* as a function of *t*. Show your work for credit. Calculator only solutions will receive no credit.

2. The function $S(t) = 40 + 30(.43)^t$ gives the temperature in °F of a can of soda after it has been cooling in a refrigerator for t hours. (The parts of this problem are mostly independent of each other. You can do one without doing the others.)

   a. In words, what is the input (independent variable) for S ?
   _____

   b. In words, what is the output (dependent variable) for S ?
   _____

   c. In words, what is the input for S^{-1}?
   _____

   d. In words, what is the output for S^{-1}?
   _____

   e. In words, what does the inverse function S^{-1} tell us, that is, what does it do, in <u>this particular situation</u>?

   f. Find the formula for the inverse function S^{-1}. Show your work.

   g. How long does it take the soda to reach 41 °F?

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Embedded Assessment Action Report

For

Program Review

Degree Program(s): BS (Mathematics Major/Minor Course)

(BA, BS, BFA, MA, MS, LACC, etc.)

Course # / Title: Mathematical Statistics

Faculty name: Cheryl Beaver

Date: June 7, 2008

A) State the program **learning outcome** or **general education goal** this assessment is linked to:

- Mathematical Knowledge – mastery of a body of mathematics.
- Develop problem solving, modeling and technological skills.
- Understand the distinction between applied and theoretical mathematics, the connection between the two fields, and the breadth of each field.
- Modeling Skills – the ability to translate various real-world scenarios into mathematical models.

B) Check the embedded assessment tool(s) used :

X Exam question
☐ Essay
☐ Oral presentation
☐ Thesis
☐ Portfolios
☐ Practicum / Service Learning
☐ Capstone paper / project
X Other Project (non-capstone)

Attach a copy of the actual question / assignment as it is presented to the student or a description of the embedded process.
Please submit a copy of this action report to the LAS dean's office.

Exam Questions

1. A study analyzing gas prices in urban versus rural locations of Western Oregon was performed. Let X denote the price of a gallon of regular gas at an urban gas station in Western Oregon and let Y denote the price of a gallon of regular gas at a rural gas station in Western Oregon. Assume that X ~ N(μ_X , 0.0225) and Y ~ N(μ_Y ,0.0441). The researchers wished to test the null hypothesis:

$$H_0 : \mu_X = \mu_Y$$

against the alternative hypothesis

$$H_1 : \mu_X > \mu_Y$$

using a confidence level of 0.05.

a) In a random sample of n = 30 urban gas stations, they found $\bar{x} = 4.01$, and in a random sample of m = 42 rural gas stations, $\bar{y} = 3.89$. What is the conclusion of the test?

b) What is the p-value of the test? Does this support the answer you found in a)? Explain.

c) Find a one-sided 95% confidence interval giving a lower bound for $\mu_X - \mu_Y$. Does the confidence interval support the conclusion of the hypothesis test in a)? Explain.

2. Suppose that a set of random samples $X_1,\ldots,X_n$ came from a Poisson distribution with p.m.f.

$$f(x) = \frac{\lambda^x e^{-\lambda}}{x!} \qquad x = 0,1,2,...$$

Find the maximum likelihood estimator for λ.

Statistics Project

Math 366 Spring 2008

Project Part 1:

1. Choose a question you'd like answered or a hypothesis you want tested. Make it relevant to you. Try to guess the distribution and identify the parameters you are looking for.
2. Determine your target population
3. Determine your method for gathering samples (you will need at least 20 samples)
   - ♦ Try to identify any bias in your methods
   - ♦ Will your sample accurately represent your target population? If not, either modify your sampling method or better identify your population.

(Informal) Presentation 1:

Friday May 16: Present your proposed question to the class. Type or neatly write answers to the following (you will turn it in). This will be a short (few minutes each) informal verbal presentation introducing your topic.

Question:

Expected distribution:

Parameters to estimate:

Targeted Population:

Method for gathering data:

Possible Biases:

Project Part 2:

4. Gather your data (at least 20 data points).
5. Display your data in a graph that best illustrates your results.
6. Estimate your answer/parameters giving a confidence interval for your results or the outcome of a hypothesis test.
7. Interpret your results.
8. Propose ways your study could have been improved.
9. Neatly write or type up these results and turn in on the day of your presentation.

Presentation 2:

Wednesday June 4: Present your results to the class.

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Embedded Assessment Action Report

For

Program Review

Degree Program(s): __BS/BA Education with an Elementary Mathematics or Middle School Math Focus

Course # / Title: _MTH 392 College Algebra for Elementary Teachers____

Faculty name: __Laurie Burton, Klay Kruczek_____

Date: _____June 16, 2008_____

A) State the program **learning outcome** or **general education goal** this assessment is linked to:

- Communication Skills - Ability to precisely articulate (both in writing and orally) K – 8 mathematical topics in a way that is clear and understandable to elementary and middle school students.

- Ability to Model Problems – the ability to translate various real–world scenarios into mathematical models that can be explored by hands-on models, paper-and-pencil methods and technological applications where appropriate..

B) Check the embedded assessment tool(s) used :

☒ Exam question
☐ Essay
☒ Oral presentation
☐ Thesis
☐ Portfolios
☐ Practicum / Service Learning
☐ Capstone paper / project
☐ Other _____

Attach a copy of the actual question / assignment as it is presented to the student or a description of the embedded process.

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Oral Final Exam Question:

For $p(x) = x^2 – 5x – 6$. Using algebra pieces, what are the x intercepts of the function? The y intercept? The Range? The turning point? Graph the function completely.

Students are assessed using the following rubric:

ALGEBRA PIECES / MODEL				**EXPLANATION**			
Excellent	**Partial +**	**Partial -**	**Poor**	**Excellent**	**Partial +**	**Partial -**	**Poor**
5	**4.5**	**4**	**3.5**	**3**	**2**	**1**	**0**

LAS
Embedded Assessment Action Report
For
Program Review

Degree Program(s): __BS/BA Education
(BA, BS, BFA, MA, MS, LACC, etc.)

Course # / Title: _MTH 396 Elementary Problem _____

Faculty name: __Cheryl Beaver, Klay Kruczek_____

Date: _____June 16, 2008_____

A) State the program **learning outcome** or **general education goal** this assessment is linked to:

- Problem Solving and Problem Writing Skills - the ability to create and understand complicated situations, which are applications of K-8 mathematical topics and to apply learned skills and techniques to resolve them.

B) Check the embedded assessment tool(s) used :

☐ Exam question
☐ Essay
☐ Oral presentation
☐ Thesis
☒ Portfolios
☐ Practicum / Service Learning
☐ Capstone paper / project
☐ Other _____

Attach a copy of the actual question / assignment as it is presented to the student or a description of the embedded process.

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Problem Writing:
Write your very own multi-step story problem that can be solved and will be solved most effectively using one of the prescribed problem solving strategy below:

- draw a diagram or use a picture
- make a list of all the possibilities or eliminate possibilities
- sub-problems or patterns
- algebra
- Venn Diagrams

Try to make the problems **interesting** and **relevant** to children's lives, and thus useful for you upon entry into the teaching profession. Generally, the problem should be appropriate for grades levels 4 – 7.

The entire portfolio problem is assessed on a scale of 25 points.
Prescribed Strategy: Two points are given for specifying which problem solving strategy your problem is illustrating.

Problem: Ten points are given for this section of the assignment which contains the wording of the actual problem:

- Two points are given for a problem that can be best solved using the prescribed strategy in the assignment.
- Two points are given for writing a problem that illustrates an important mathematical idea.
- Three points are given for an interesting story.
- Three points are given for clarity and good use of language.

The remaining thirteen points are assigned as follows:

- Six points for a complete and correct **Solution**.
- Four points for **Verification**.
- Three points for the **Comments for Teachers** section.

The **Comments for Teachers** section can include ideas for (a) extending or generalizing the problem, (b) reflective comments about which topics this problem illustrates within the K-12 mathematics curriculum, and/or (c) which grades the problem is appropriate for.

LAS
Embedded Assessment Action Report
For
Program Review

Degree Program(s): __BS/BA Education with a Middle School Math Focus
(BA, BS, BFA, MA, MS, LACC, etc.)

Course # / Title: _MTH 494 Geometry for Middle School Teachers_____

Faculty name: __Klay Kruczek_____

Date: _____June 16, 2008_____

A) State the program **learning outcome** or **general education goal** this assessment is linked to:

- Communication Skills - Ability to precisely articulate (both in writing and orally) K – 8 mathematical topics in a way that is clear and understandable to elementary and middle school students.
- Effective Classroom Management - Appreciation of a variety of pedagogical approaches and knowledge of an assortment of presentation and classroom working environments to effectively support the learning of mathematics for students with diverse learning styles.

B) Check the embedded assessment tool(s) used :

☒ Exam question
☐ Essay
☒ Oral presentation
☐ Thesis
☐ Portfolios
☐ Practicum / Service Learning
☒ Capstone paper / project
☐ Other _____

Attach a copy of the actual question / assignment as it is presented to the student or a description of the embedded process.

Please submit a copy of this action report to the LAS dean's office.

Oral Final Exam Questions

1. Explain how to tessellate the plane with an arbitrary quadrilateral and explain why this tessellation works.
2. Explain the ratio of the perimeter/area of a scaled figure to the perimeter/area of the original figure. Why does this happen?
3. Suppose you are given a two-dimensional figure and its (congruent) image after an isometry is performed. You should be able to identify which isometry was performed by looking at the original figure and its image. You should also be able to create the operation using a compass and straightedge.

Written Paper: Formal lesson plan for school children on a geometric topic with at least one activity for school children. Read and use at least the following resources:

- ✓ Two state adopted K – 8 textbooks; two different grade levels.
- ✓ One article, preferably from the NCTM's *Teaching Children Mathematics.* The NCTM's *Mathematics Teaching in the Middle School* journal is also acceptable.
- ✓ The NCTM Standards or Standards Summary