The Mathematics Program Assessment

B.S. Degree

Program Assessment summary

2009-2010 Cycle

Executive Summary:

Like most Mathematics programs, the Mathematics program at Lincoln University offers a wide range of courses to almost all students. Our assessment Plan is a development tool structured to map specific learning goals to courses that our Math majors take and to measure the program's effectiveness through the program student learning outcomes (PSLOs). Beginning in the Fall of 2009, we altered and began our data collection regime on PSLOs of Math majors. Our findings are that our majors readily meet the standards of those PSLOs measured through a sequence of courses (such as Calculus) earlier in the duration of their studies. However, this proficiency falls off as they progress through their studies. Program outcomes measured through higher-level courses at the later stage present mixed results. All majors satisfactorily met the standards of the program outcome that measures probability and statistics, whereas the results on the program outcome that measures proficiency in linear algebraic systems indicate that our majors are not as well prepared. Although the current data indicate that our majors show proficiency in applying technology in support of mathematical reasoning as measured through computer programming, the next assessment cycle's data should show whether these results can be reproduced in other areas of mathematics. The department will implement refined assessment instruments for the next assessment cycle to confirm the consistency of these findings, and in order to take appropriate measures.

I. Purpose

The Mathematics Assessment plan is structured to:

- Map specific learning goals to courses that Math majors take
- Analyze data on student learning outcomes (SLOs) thereby enabling the evaluation of students proficiencies
- Provide feedback to instructors on SLOs to help identify areas to improve proficiency
- Encourage students to revisit and refresh mathematical concepts and material learned throughout the program

II. Mission Statement

The mission of the program is to provide students with the tools needed for life-long learning with a global perspective in alignment with the mission of Lincoln University to provide an inspiring academic experience that develops core mathematical knowledge and skills. Through its curriculum and teaching methods the program will strive to provide quality education with a focus on general mathematics, actuarial sciences, and mathematics education to a diverse group of students, especially the underrepresented groups in these fields such as African-Americans and women. In order to prepare our students for the ever-evolving technological advancements, our faculty will pursue innovative teaching approaches targeting core courses.

III. Program goals

The faculty of the Department of Mathematics endorses the following program goals:

1. Produce qualified graduates who can successfully acquire gainful employment in the area of mathematics and related scientific areas.
2. Produce graduates who can qualify for admissions to graduate degree programs in general mathematics and related mathematics disciplines.
3. Produce graduates who are prepared to enter the field of Actuarial science.
4. Produce graduates who can teach mathematics at the secondary school level.

IV. Program Student Learning Outcomes (PSLOs)

1. Demonstrate proficiency in fundamental mathematical skills such as differentiation and integration of elementary and transcendental functions (single and multivariable), and application of related concepts.
2. Demonstrate mathematical writing proficiency (examples include the PA Secondary School Teacher Lesson Plan, Internship Reports and Capstone Research Projects).
3. Demonstrate proficiency in the use of logical reasoning and critical thinking to construct proofs and solve problems.
4. Demonstrate mastery of the notions of vector spaces, linear transformations, matrices and their determinants, and applications in solving linear systems.

5. Demonstrate proficiency in the fundamentals of probability and statistics.
6. Demonstrate independent knowledge acquisition through reading mathematical writing such as that in text books, handout material or any assigned reading.
7. Demonstrate effective use of technology tools to support mathematical reasoning and solve mathematical problems arising from a variety of application domains.

V. Assessment Methods and Sources of Data

- **Current Direct Assessment Methods at the Program Level**
  1. Embedded Questions in Cumulative Final Exam
  2. Projects and/or Portfolios
  3. Capstone Course Reports and Presentations
- **Proposed Direct Assessment Methods at the Program Level**
  1. Exit Exam
- **Indirect Assessment Methods at the Program Level**
  1. Student Satisfaction Survey
  2. Exit Interview
  3. Student Teaching Evaluation

- **Direct Assessment Methods at the Course Level**
  1. Pre-tests/Post-tests: These tests are designed to assess each student's proficiency in the course content and concept, or general mathematical knowledge. Additionally, they are also designed to assess student improvement as measured by the post-test 14 weeks later.

  2. Embedded Questions in Tests and Final Exams: These tests are designed to assess each student's proficiency in target PSLOs through course SLOs. Additionally, they are designed to assess student improvement as measured by various tests during the semester. All students at all levels are required to take these tests.
  3. Projects
  4. Portfolios
  5. Selected Homework
- **Indirect Assessment Methods at the Course Level**
  1. Course grades: The grades assess the SLOs of all courses as specified in the relevant syllabi.

VI. Curriculum Map

Table 1 - The curriculum map details student learning opportunities

Courses	PSLOs						
	1	2	3	4	5	6	7
MAT-121; Calculus I	L H Rd						
MAT-122; Calculus II	L H Rd						
MAT-211; College Geometry		L H P	L H Rd				H Rd
MAT-214; Linear Algebra				L H Rd			L H Rd
MAT-220; Set Theory and Logic**		P	L H Rd				
MAT-221; Calculus III	L H Rd						L H Rd
MAT-222; Differential Equations	L H Rd						L H Rd
MAT-310; Methods of Teaching (Secondary) Math **		P				P	P
MAT-313; Numerical Methods	R			L H Rd			L H Rd P
MAT-325; Modern Algebra I			L H Rd				
MAT-341; Mathematical Statistics I	R				L H Rd		
MAT-342; Mathematical Statistics II	R				L H		
MAT-400 or 401; Topics in Math I or II		P	R			P	
MAT-421; Analysis I **	R		L H Rd				
MAT-422; Analysis II	R		L H Rd				
MAT-475-476; Seminar I or II **		P	R			P	
MAT 495 Independent Research**		P	P			P	
MAT 498 Internship **		P	R			P	
CSC158; Computer Programming I		P					L R P
CSC159; Computer Programming II		P					L R P

Description of Legends: L-Lectures, **H-**Homework, **Rd-**Readings, **R-**Review or Reinforcement, **P-**Projects and/or Portfolios

**Designated Writing Emphasis Courses

VII. PSLOs linked to the Curriculum Map

Table 2 – The proficiency of each student in the PSLOs is evaluated using direct assessment tools in each course as indicated in Table 2 below.

Courses	PSLOs						
	1	2	3	4	5	6	7
MAT-121; Calculus I	H E						
MAT-122; Calculus II	H E						
MAT-211; College Geometry		P	H E				H
MAT-214; Linear Algebra				H E			H E P
MAT-220; Set Theory and Logic**		P	H E P				
MAT-221; Calculus III	H E						H E
MAT-222; Differential Equations	H E						H
MAT-310; Methods of Teaching (Secondary) Math **		P				P	P
MAT-313; Numerical Methods				H E			H P
MAT-325; Modern Algebra I			H E				
MAT-341; Mathematical Statistics I					H E		
MAT-342; Mathematical Statistics II					H E		
MAT-400 or 401; Topics in Math I or II		P				P	
MAT-421; Analysis I **	H E					H E	
MAT-422; Analysis II	H E					H E	
MAT-475-476; Seminar I or II **		P				P	
MAT 495 Independent Research**	P	P	P	P	P	P	P
MAT 498 Internship **		P				P	P
CSC158; Computer Programming I		P					P
CSC159; Computer Programming II		P					P

Description of Legends: H- Selected Homework, **E**- Embedded Questions in Tests and Final Exams, **P-**Projects and/or Portfolios

VIII. PSLOs Rubrics and Scoring Scale

Question Grading Rubrics:

If the student:

- Shows neither the mathematical concept nor the process in arriving at a wrong solution to a problem, then the student earns 0% of the total score of the question
- Shows only the mathematical concept or process in arriving at a wrong solution to a problem, then the student earns 25% of the total score of the question
- Shows neither the mathematical concept nor process in arriving at a correct solution to a problem, then the student earns 50% of the total score of the question
- Shows only the correct process or the mathematical concept in arriving at a correct solution to a problem, then the student earns 75% of the total score of the question
- Shows both mathematical concept and process in arriving at a correct solution to a problem, then the student earns 100% of the total score of the question

Table 3 – Scoring Scale used in the Assessment of PSLOs.

Average % from Grading Rubric	Overall Rating	Student Status
90-100%	3 - Excellent	Proficient
70-89%	2 – Good (or Satisfactory)	
50-69%	1 – Fair (or Needs Improvement)	Not Proficient
0 – 49%	0 – Poor (or Unacceptable)	

IX. Summary Analysis and Assessment of Results

The following analysis focuses on the courses taken by the program majors during Fall 2009 to Spring 2010 semesters.

Table 4 – PSLOs 1, 4, 5 and 7 Assessed through Courses Taken during the 2009-2010 Cycle.

Courses	PSLOs						
	1	2	3	4	5	6	7
MAT-121; Calculus I	E						
MAT-122; Calculus II	E						
MAT-214; Linear Algebra				E			
MAT-221; Calculus III	E						
MAT-222; Differential Equation	E						
MAT-310; Methods of Teaching (Secondary) Math		P					
MAT-341; Mathematical Statistics I					E		
MAT-342; Mathematical Statistics II					E		
CSC158; Computer Programming I							E P
CSC159; Computer Programming II							E P

Description of Legends: **E**- Embedded Questions in Tests and Final Exams, **P-**Projects and/or Portfolios

Table 5 – Assessment Results for PSLO # 1

PSLO # 1 Demonstrate proficiency of fundamental mathematical skills such as differentiation and integration of elementary and transcendental functions (single and multivariable), and analysis and application of related concepts Target core courses used to evaluate SLO: MAT 121, 122, and 221			
SUMMARY OF DATA (Fall 2009 - Spring 2010)			
MAT 121 Calculus I	3. Excellent 2. Satisfactory 1. Needs Improvement 0. Unacceptable	75% 0% 0% 25%	75% (3 out of 4 majors) Proficient
MAT 122 Calculus II	3. Excellent 2. Satisfactory 1. Needs Improvement 0. Unacceptable	29% 29% 29% 13%	58% (4 out of 7 majors) Proficient
MAT 221 Calculus III	3. Excellent 2. Satisfactory 1. Needs Improvement 0. Unacceptable	0% 0% 0% 100%	0% (0 out of 2 majors) Proficient
MAT222 Differential Equations	3. Excellent 2. Satisfactory 1. Needs Improvement 0. Unacceptable	0% 50% 0% 50%	50% (1 out of 2 majors) Proficient

PSLO #1: Demonstrate proficiency of fundamental mathematical skills such as differentiation and integration of elementary and transcendental functions (single and multivariable), and analysis and application of related concepts.

This program outcome was assessed by looking at student performance in Calculus I, II and III as well as Differential Equations. Of the 4 majors who took Calculus I, three (75%) met the standards for program SLO #1 through the material covered in the course. Out of the 7 students who took Calculus II, 4 (58 %) met the standards of the program SLO. Both students who took Calculus III failed to meet the standards, and only one of the two students who took Differential Equations met the standards for program SLO #1 as addressed in the course material.

Table 6 – Assessment Results for PSLO # 2

Program SLO # 2 Every student will produce a portfolio of written mathematical work (examples include lesson plans, internship reports and capstone research projects). Target core course used to evaluate SLO: MAT 310			
SUMMARY OF DATA (Spring 2008 and Fall 2010)			
MAT-310 Methods of Teaching (Secondary) Math Spring 2008 n= 1	3. Excellent 2. Satisfactory 1. Needs Improvement 0. Unacceptable	0% 100% 0% 0%	100% (1 out of 1 major) Proficient
MAT-310 Methods of Teaching (Secondary) Math Fall 2010 n= 2	3. Excellent 2. Satisfactory 1. Needs Improvement 0. Unacceptable	0% 100% 0% 0%	100% (2 out of 2 majors) Proficient

Program SLO # 2 Every student will produce a portfolio of written mathematical work (examples include lesson plans, internship reports and capstone research projects).

The program outcome was assessed by evaluating the final versions of student portfolios in the course. Of the 3 majors that took the course, all three met the standard at the satisfactory level, however none met the standard at an excellent level.

Table 7 – Assessment Results for PSLO # 4

PSLO # 4 Demonstrate proficiency in solving linear algebraic systems Target core courses used to evaluate SLO: MAT 214			
SUMMARY OF DATA (Fall 2009 - Spring 2010)			
MAT- 214 Linear Algebra	3. Excellent 2. Satisfactory 1. Needs Improvement 0. Unacceptable	25% 0% 25% 50%	25% (1 out of 4 majors) Proficient

PSLO #4: Demonstrate proficiency in solving linear algebraic systems

This program outcome was assessed by looking at student performance in Linear Algebra. Of the 4 majors who took Linear Algebra, only one met the standards for program SLO #4 and one needed improvement, whereas the other two did not meet the standards of the program outcome.

Table 8 – Assessment Results for PSLO # 5

PSLO # 5 Demonstrate proficiency in the fundamentals of probability and statistics Target core courses used to evaluate SLO: MAT 341 and 342			
SUMMARY OF DATA (Fall 2009- Spring 2010)			
MAT 341 Mathematical Statistics I	3. Excellent 2. Satisfactory 1. Needs Improvement 0. Unacceptable	50% 50% 0% 0%	100% (2 out of 2 majors) Proficient
MAT 342 Mathematical Statistics II	3. Excellent 2. Satisfactory 1. Needs Improvement 0. Unacceptable	100% 0% 0% 0%	100% (1 out of 1 major) Proficient

PSLO #5: Demonstrate proficiency in the fundamentals of probability and statistics.

This program outcome was assessed by looking at student performance in Mathematical Statistics I and II. Although both majors who took Math Stats I met the standards for program SLO #5 through the material covered in the course, only one of them showed proficiency in the material, while the other performed satisfactorily. The student who was proficient in Math Stats I went on to show proficiency in Math Stats II and thus meeting the standards for program SLO #5 as well.

Table 9 – Assessment Results for PSLO # 7

PSLO # 7 Demonstrate effective use of technology tools to support mathematical reasoning and solve mathematical problems arising from a variety of application domains Target core courses used to evaluate SLO: CSC 158 and CSC 159			
SUMMARY OF DATA (Fall 2009- Spring 2010)			
CSC - 158 Programming I	3. Excellent 2. Satisfactory 1. Needs Improvement 0. Unacceptable	67% 33% 0% 0%	100% (3 out of 3 students) proficient
CSC - 159 Programming II	3. Excellent 2. Satisfactory 1. Needs Improvement 0. Unacceptable	50% 0% 50% 0%	50% (1 out of 2 students) proficient

PSLO # 7: Demonstrate effective use of technology tools to support mathematical reasoning and solve mathematical problems arising from a variety of application domains Assessment Methods and Sources of Data

This program outcome was assessed by looking at student performance in Computer Programming I and II. Four out of the five majors (80%) met standards of program SLO #7. Three of the students met the standards through successful mastery of the material (such as writing and debugging algorithms) as addressed in Computer Programming I, and the other through Computer Programming II. The last student who had not met the program outcome standards took Computer Programming II.

X. Action Plan /or Recommendations Based on Results of Assessment

- **Action Plan and/or Recommendations for 2010-2011 to be addressed within the Department of Mathematics**

  - Include additional program SLOs for 2010-2011 Assessment Cycle
  - This cycle of data appear to show that as students are progressing from Calculus I to Calculus III, proficiency in SLO1 diminishes. We believe implementation of Pre- and Post-tests may highlight the areas or topics responsible for this decline in student performance.
  - Recommend implementation of SLO rubrics that will be used at all levels of the curriculum map
  - Faculty members will proactively share information on all SLOs with consistently poor proficiency to improve teaching, learning and curriculum
  - Provide additional learning opportunities for PSLO #1 and PSLO #4
  - Design an Exit Exam (Summative Exam) for graduating Math majors

- **Long Term Action Plan and/or Recommendations for 2010-2011 to be addressed as a collaborative effort with the School of Natural Sciences & Mathematics**

  - Implementation of the SI program in Mathematics would help the students revisit the information learned often thus sharpening their comprehension of course material as well as its retention and subsequently improve and/or maintain proficiency in subsequent courses.

The Supplemental Instructions (SI) Program is newly adopted program funded by the National Science Foundation (NSF) through the School of Natural Sciences and Mathematics. It is designed to target students retention rate by providing out-of-class instructional support to students enrolled in historically high failure rate courses in science and mathematics. Its mission is to inspire and empower the students through weekly Supplemental Instruction Sessions (SIS), to develop the learning strategies necessary to reach their full academic potentials so that the students participating in the SI sessions will obtain proficiency in the subject matter and a "C" grade or better in the SI class.

- Emphasize to students the need to work with SI Leaders or Tutors to review and learn course material

APPENDIX A – Sample Embedded Assesment Instruments for Program SLO #1

Calculus I & II

1. For each of the functions given below, find the indicated derivatives **(15 pts)**

   a. $y = e^{x^2} + 5x$; $\dfrac{d^2y}{dx^2}$

   b. $y = \tan^{-1}(\ln\theta)$; find $\dfrac{dy}{dx}$

2. Use implicit differentiation to find the indcated derivative for each function **(14 pts)**

   $e^{x^2 y} = 2x + 2y$, find $\dfrac{dy}{dx}$

3. Evaluate the given integral **(5 pts)**

$$\int_3^2 \frac{1-\sqrt{x}}{\sqrt{x}}dx$$

4. Use the substitutions of $\boldsymbol{u}$ shown, and your own to evaluate the given indefinite integrals **(15 pts)**

   a. $\int\left(1-\cos\dfrac{t}{2}\right)^2 \sin\dfrac{t}{2}dt$, $u = 1-\cos\dfrac{t}{2}$

   b. $\int \dfrac{6\cos t}{(2+\sin t)^3}dt$

Calculus III

1. Find (i) the domain, (ii) the range for the functions given below. **(12 pts)**

   a. $\boldsymbol{f}(\boldsymbol{x},\boldsymbol{y}) = \dfrac{1}{\sqrt{16-\boldsymbol{x}^2-\boldsymbol{y}^2}}$

2. Sketch a typical level curve for the function $\boldsymbol{f}(\boldsymbol{x},\boldsymbol{y},\boldsymbol{z})) = \boldsymbol{x}+\boldsymbol{z}$. **(6 pts)**

3. Find the limit $\lim\limits_{(\boldsymbol{x},\boldsymbol{y})\to(1,1)} \dfrac{\boldsymbol{x}^2-\boldsymbol{y}^2}{\boldsymbol{x}-\boldsymbol{y}}$. **(6 pts)**

4. Find $\boldsymbol{f}_x$, $\boldsymbol{f}_y$ and $\boldsymbol{f}_z$ for the functions given below **(30 pts)**

   a. $\boldsymbol{f}(\boldsymbol{x},\boldsymbol{y},\boldsymbol{z}) = \boldsymbol{xy}+\boldsymbol{yz}+\boldsymbol{xz}$

   b. $\boldsymbol{f}(\boldsymbol{x},\boldsymbol{y},\boldsymbol{z}) = \boldsymbol{e}^{-\boldsymbol{xyz}}$

5. Change the Cartesian integral $\int_{-a}^{a}\int_{-\sqrt{a^2-x^2}}^{\sqrt{a^2-x^2}} dydx$ into an equivalent polar integral, and then evaluate the polar integral. **(15 pts)**

6. For the given vectors $\boldsymbol{v} = \left\langle \frac{1}{\sqrt{2}}, \frac{1}{\sqrt{3}} \right\rangle$ and $\boldsymbol{u} = \left\langle \frac{1}{\sqrt{2}}, -\frac{1}{\sqrt{3}} \right\rangle$, find: **(15 pts)**
   a. $\boldsymbol{v} \cdot \boldsymbol{u}$, $|\boldsymbol{v}|$, $|\boldsymbol{u}|$
   b. The angle between $\boldsymbol{u}$ and $\boldsymbol{v}$
   c. The scalar component of $\boldsymbol{u}$ in the direction of $\boldsymbol{v}$
   d. The vector $\text{proj}_{\boldsymbol{v}}\boldsymbol{u}$

7. Find the Polar coordinates of the point $(1, \sqrt{3})$ (given in rectangular coordinates). **(5 pts)**

8. Replace the polar equation $r\sin\theta = \ln r + \ln\cos\theta$ with the equivalent rectangular Cartesian equation and then identify the graph.
   (12 pts)

APPENDIX B – MODIFIED SCORING RUBRIC FOR PORFOLIOS

Score	Criteria	Student Status
3 - Proficient	Response to each component of the problem is complete and accurate. All instructions followed completely. *Math310 Methods of teaching Secondary Math - this criteria for this course means that the students' portfolios are complete, entirely free of grammatical or formatting errors, mathematical writing is correct and appropriately analytical and logically organized.*	Meets Standards
2 - Satisfactory	Response to most but not all components of the problem is complete. Some errors were made. *Math310 Methods of teaching Secondary Math - this criteria for this course means that the students' portfolios are complete, but may contain a few minor grammatical or formatting errors, mathematical writing is mostly correct and appropriately analytical and logically organized but may still require refinement and minor reorganization .*	
1 - Needs Improvement	Response to all components of the problem only partially correct. *Math310 Methods of teaching Secondary Math - this criteria for this course means that the students' portfolios are incomplete, may contain too many minor grammatical or formatting errors, mathematical writing is partially correct but not appropriately analytical and logically organized, the work requires substantial refinement and reorganization .*	Does Not Meet Standards
0 - Unacceptable	Response to all components of the problem only partially correct. *Math310 Methods of teaching Secondary Math - this criteria for this course means that the students' portfolios are incomplete, contain many minor grammatical or formatting errors, mathematical writing is mostly filled with errors and not appropriately analytical nor logically organized, the work requires complete rewriting and reorganization .*	

APPENDIX C – SAMPLE STUDENT PORTFOLIO – TEACHING PLAN

Semester:	Fall 2010
Grade Level:	9th
Content Area:	Mathematics
Subject:	Algebra I
Title:	Adding and Subtracting Polynomials the Proper Way **(Lesson 2)**

Learning Objective:	Students will be able to use terms and techniques correctly to solve addition and subtraction problems
Standards:	*P.A. Academic Standard 2.8.A1.B* Evaluate and simplify complex algebraic expressions for example: sum of polynomials
Vocabulary:	Polynomial, binomial, Coefficient, F.O.I.L Method
Safety Considerations:	Not Applicable
Lesson Sequence	*INTRODUCTION* ❖ Review the concepts of [already written on the board prior to the students walking in] ➢ Polynomial: a term or sum of terms which has non-negative integer exponents only (x^2-4x+7) ➢ Binomial: a polynomial with only two terms (x^2-6) ➢ Coefficient: the number in front of a variable $9x^2$ the coefficient is 9 *MODELING:* ❖ Write up $2x^2+4x+3+6x^2+8x+9$ ➢ The first step to solving this problem is to identify the like terms ▪ Ask students what they think are like terms? • Like Terms: are terms that have the exact same variable and exponent ◆ Ask students for an example prior to writing up given examples below ◆ EXAMPLE: $x^2, 2x^2$ OR $x^6, 6x^6$ ➢ *The second step is combing like terms*

	▪ $2x^2 + 6x^2 + 4x + 8x + 3 + 9$ • $=8x^2 + 12x + 12$ ❖ Write up another example $4x^2 + 6x + 8x^3 + 7x + 11x^2 + x + 6$ ➢ Ask for volunteers, to come to the board and have them show what the like terms, and then combine the like terms ▪ $8x^3 + 4x^2 + 11x^2 + 6x + x + 7x + 6$ *(showing the like terms)* ❖ $8x^3 + 15x^2 + 14x + 6$ *(combining like terms)* ❖ *INDEPENDENT PRACTICE* ❖ Hand out baggies with cut outs of different shapes and colors (9) ❖ Hand out sheet with directions written on sheet (9) ❖ Pose the question: When looking at this baggie what "like terms" do you see. ➢ Shape ➢ Color ➢ Shape/color ➢ Give each color a variable ▪ DIRECTIONS: On the provided sheet combine like terms in each of the categories, (shape, color, shape/color, and with variables) ▪ EXAMPLE  *1 (BY SHAPE)* 3□ +2 △+4○ *2(BY COLOR)2O+2W+3P+1Y* *3 (BY SHAPE/COLOR)* *4 (BY VARIABLE)$3x^3+2x^2+x+3$* *If class is not done with the 4 ways to combine the shapes, they must take them home and turn the paper in for homework* *CLOSURE:* ❖ Make sure all questions are answered ❖ Pass out homework, and give directions ➢ Provide time for students to look over homework and

	see if they have questions
Assessment:	Informal: 1. Their progress and accuracy when doing problems when doing problems at their seats Formal: Graded homework (2 sheets)
Modifications:	• Only have them do two of the four like terms (by color and by shape)

APPENDIX D – VARIOUS STUDENT EVALUATION FORMS USED FOR DIRECT/INDIRECT ASSESSMENT

Student Research Evaluation Form

(***To be completed by the supervising professor***)

Department of Mathematics and Computer Science, Lincoln University

Name of Student _____

Course number _____

Semester_____

Supervising Professor_____

Brief Description of Student Research_____

_____

_____

_____

Please rate the Student's research work on a scale from 1 to 4 as follows:

(4) Outstanding
(3) Good
(2) Fair
(1) Poor
(N/A) Not applicable.

Goals and objectives of research assignments reached _____

Accepts assignments willingly _____

Completes assignments on time_____

Able to represent complex models in an organized way_____

Able to find and use resources applicable to the research assignments_____

Able to apply knowledge and work independently _____

Accepted suggestions, directions and critical evaluations _____

Summarized results in a written research paper _____

Presented results in a 5-10 minute oral presentation of the research _____

* Please attach any other Evaluation material Notes on the overall evaluation of student's research work for this course:

_____

_____

Final Grade for the course _____

_____ _____

Supervising Professor's signature Date

_____ _____

Student' s signature Date

Student Internship Evaluation Form

(***To be completed by the work supervisor***)

Department of Mathematics and Computer Science, Lincoln University

Name of Intern _____

Date of Internship _____

Company/Program _____

Brief Description of Intern Responsibilities _____

_____

_____

_____

Please rate the Intern on a scale from 1 to 4 as follows:

(4) Outstanding – Consistently exceptional in fulfilling requirements.

(3) Good – Regularly meets and occasionally exceeds minimum requirements.

(2) Fair – Does passable work but does not extend oneself.

(1) Poor – Fails to meet minimum requirements.

(N/A) Not applicable.

Overall performance of internship responsibilities _____

Possesses the skills necessary for the position _____

Behaves in a professional manner _____

Accepts assignments willingly _____

Completes assignments on or before due date _____

Displays ability to organize self and resources _____

Able to apply knowledge and work independently _____

Works effectively with others _____

Accepts suggestions, directions and critical evaluations _____

Able to communicate well _____

* Please attach any other Evaluation material

Additional comments regarding the performance of the Intern in this position:

_____

_____

_____

_____

_____

_____
_____

_____ _____
Supervisor' s signature Date

_____ _____
Student' s signature Date

Entrance Interview Form

Department of Mathematics and Computer Science, Lincoln University

Name:_____

Campus mailbox: _____

Campus phone:_____

Email address:_____

Home Address: _____

Which major are you declaring?_____

Who is your adviser?_____

Do you have a second major or minor?_____

Are you interested in taking part in the Mathematics or Computer Science Club?_____

Why did you choose this Math/CS major?

What are your possible career plans?

What kind of math and/or computer science experiences did you have in high school?

What are you most interested in learning?

What part of the program do you think might be the most difficult for you?

Any questions?

Please consult with the department chairperson for any program updates or corrections which may not be yet reflected on this page _ last updated 6/1/2007.
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Exit Interview Form

Department of Mathematics and Computer Science, Lincoln University

Name:_____

Email address:_____

Home Address: _____

Home phone: _____

Cell phone: _____

What is your major _____

Do you have a second major or minor?_____

Have you applied to and/or been accepted to graduate school? If so, where and what program?

Have you applied to and/or been accepted for a job? If so, where and what position?

Do you have any other plans for after graduation?

Overall, how satisfied were you with the program in your major?

Overall, how satisfied were you in the advising you received in your major? (from others in the department as well as your own individual adviser)

What parts of the program did you think were the most and least useful?

What parts of the program did you think were the most and least interesting?

What parts of the program did you think were the most and least difficult?

What do you think would improve the program?

Would you advise other students to choose this major at Lincoln?

Any other comments?

Please consult with the department chairperson for any program updates or corrections which may not be yet reflected on this page _ last updated 6/1/2007.

Senior Portfolio Evaluation for Mathematics Majors

Department of Mathematics and Computer Science, Lincoln University

Name of Student _____ Student ID_____

Major Program _____Semester of Graduation _____

Evaluation Committee _____

Portfolio Contents (check if included)

- ☐ Entrance Interview upon declaration of the major (form attached).
- ☐ Transcripts showing satisfactory completion of all required courses (see major).
- ☐ Capstone Course summary, including location, date, abstract or report, and evaluation of any supervisor (internship/seminar evaluation form attached).
- ☐ Minimum of 5 examples of evidence submitted by the student demonstrating application of the content of the major to achieve all program student learner competencies
- ☐ Examples of extracurricular projects, e.g. analysis of literature; description of attendance at professional conferences; summary of research; oral presentations or posters,; etc
- ☐ Self-Evaluation of Portfolio
- ☐ Peer Evaluation of Portfolio
- ☐ Teacher Recommendations
- ☐ Scores from a professional or comprehensive exam if available (e.g. GRE, Praxis, etc)
- ☐ Exit Interview upon graduation (form attached).

Please rate the student on a scale from 1 to 4 as follows:

(4) Outstanding
(3) Good
(2) Fair
(1) Poor
N/A Not applicable.

1. Demonstrate mastery of fundamental mathematical concepts, including calculus, statistics, and linear algebra, _____

2. Reason logically, think critically, and connect mathematical ideas, in particular by being able to construct proofs and reason abstractly. _____

3. Apply mathematical techniques and technology effectively to solve problems. All students will show the ability to use programming and software appropriately in applications. _____

4. Reads/ writes well technically. _____

5. Prepared for postgraduate education and/or a career. _____

6. Overall academic performance in the major. _____

7. Overall academic performance in the university. _____

Additional comments regarding the performance of the Student in Completing the Major:

_____

* Please attach any other Evaluation material

_____ has satisfactorily completed the requirements of the Senior Portfolio.
Student Name

_____ _____
Mathematics Chairperson's signature Date

_____ _____
Student's signature Date

Please consult with the department chairperson for any program updates or corrections which may not be yet reflected on this page _ last updated 8/7/2007.