The Department of Mathematics Document Series

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THE UNIVERSITY OF SOUTHERN MISSISSIPPI®

Student Handbook
Mathematics

Undergraduate Program

The University of Southern Mississippi
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1 Background and Objectives

1.1 Use and Purpose of Handbook

The following information is intended as a guide for undergraduate students who declare a major in Mathematics or Mathematics Licensure on the Gulf Coast or Hattiesburg campus of the University of Southern Mississippi. This handbook is composed of

1. a selection of policies and information pertaining to all undergraduate students (also contained in the *the Undergraduate Bulletin*) or all undergraduate students in the College of Science and Technology which are particularly relevant to undergraduate students pursuing a Mathematics BS degree or Mathematics Licensure BS degree.

2. a collection of policies adopted by the faculty of the Department of Mathematics regarding undergraduate students pursuing a Mathematics BS degree or Mathematics Licensure BS degree.

The *Undergraduate Bulletin* should be consulted for any topics not contained in this handbook, and takes precedence over any discussion here. If any policies contained in this document are found to be in violation of or in conflict with policies contained in the *Undergraduate Bulletin*, please notify the Department of Mathematics immediately.

1.2 Department Contact Information

On the Hattiesburg campus, contact the department by visiting the office of the Department of Mathematics, located in Southern Hall 319. To contact the department from off campus, use the information below:

The Department of Mathematics
The University of Southern Mississippi
118 College Drive #5045
Hattiesburg, MS 39406-0001

Phone: 601.266.4289
Fax: 601.266.5818
Email: mathdept@usm.edu

At the Gulf Coast campus, the offices of Mathematics faculty are located on the third floor of Hardy Hall.

1.3 Mission of the Department

The primary mission of the Department of Mathematics is the transmission, discovery, creation, and expansion of mathematical knowledge. Its curriculum is designed to encourage: learning based upon rational inquiry, problem solving, creativity, and intellectual initiative. Its instructional thrusts run the gamut from basic skill development designed to create a mathematically literate undergraduate populace, to meeting specific educational needs of students outside the science and technology establishment, to the creation and delivery of innovative and effective teacher-training programs, to the engendering of a strong mathematics knowledge base among those who will be charged with contributing to both the regional and national scientific enterprises. In addition, the members of our graduate faculty are also charged with the development of new and innovative curricula, with the expansion of the frontiers of mathematical knowledge, and with sharing their results with the community at large via publication and presentation.

1.4 Objectives

The Department of Mathematics has identified the following learning objectives for students pursuing the Mathematics BS/ Mathematics Licensure BS degree.

1. Students should be mathematically conversant.
2. Students should understand theory and applications of calculus
3. Students will learn the fundamental logic needed for deductive reasoning and will construct proofs of elementary theorems using quantifiers, indirect and direct proofs, and mathematical induction.
4. Students should possess an understanding of the breadth of the mathematical sciences and their deep interconnecting principles; an awareness of the abstract nature of theoretical mathematics and the ability to write proofs; and an in-depth understanding of at least one subject in mathematics.
5. The program should prepare students to be effective secondary school teachers, to be ready for graduate school, and to have meaningful and enjoyable lives.
6. Students should be able to write computer programs in a high level language using appropriate data structures to solve mathematical problems. Students should be able to create and document algorithms. Students should be able to use the computer for simulation and visualization of mathematical ideas and processes.

2 Advisement and Degree Requirements

The information in this chapter is intended as a guide for students on the Gulf Coast or Hattiesburg campus who

1. declare an undergraduate major in Mathematics
2. declare an undergraduate major in Mathematics Licensure
3. seek a minor in Mathematics OR an add-on secondary mathematics endorsement

Much of the information from this chapter is also available in the *Undergraduate Bulletin*.

2.1 Admission & Advisement

For admission into a degree program in the Department of Mathematics, all students must comply with the General Academic Regulations of the University, which are contained in the current Undergraduate Bulletin.

In addition, students who desire to pursue the Secondary Teacher Education program in mathematics (a Mathematics Licensure BS) must request formal admission to the Teacher Education program through the Dean's Office, College of Education and Psychology. Admission requirements are subject to modification; for current information, consult the *Undergraduate Bulletin* (the section entitled *Teacher Education Programs and Requirements*).

All students in the Department of Mathematics are assigned an advisor. It is the responsibility of each student to consult his/her advisor prior to registration each semester (or if problems arise). To arrange an advisement appointment, students should contact their advisor.

2.2 Degree Requirements: Mathematics BS

The table below outlines the degree requirements for a Mathematics BS degree.

GENERAL EDUCATION CURRICULUM
GEC 01. Written Communication (6 hours)
01. ENG 101, Composition One
02. ENG 102, Composition Two

GEC 02. Natural Science & Mathematics (11 hours minimum)
01. *Science Requirement (8 hours minimum)*
Select 2 courses with labs:

AST 111/L**, General Astronomy I
AST 112/L**, General Astronomy II
BSC 103/L◊**, Biology and Society
BSC 110/L◊**, Principles of Biological Science I
BSC 111/L◊**, Principles of Biological Science II
BSC 250/L**, Human Anatomy and Physiology I
BSC 251/L**, Human Anatomy and Physiology II
CHE 104/L**, Chemistry and Our Environment
CHE 106/L**, General Chemistry I
CHE 107/L**, General Chemistry II
GHY 104/L◊, Weather and Climate
GHY 105/L◊, Landforms, Hydrology and Biogeography
GLY 101/L**, Physical Geology
GLY 103/L**, Historical Geology
MAR 151/L**, Introduction to Ocean Science
PHY 103/L, Introductory Physics
PHY 111/L, General Physics I
PHY 112/L, General Physics II
PHY 201/L*, General Physics I with Calculus (Required for this Major)
PHY 202/L**, General Physics II with Calculus
PSC 190/L, Living in a Material World

02. *Mathematics Requirement (3 hours)*
Select 1 course:

MAT 100***, Quantitative Reasoning
MAT 101, College Algebra
MAT 167*, Calculus I with Analytic Geometry

GEC 03. Humanities (9 hours)
01. ENG 203, World Literature
02. Select 2 courses, 1 History course is required

HIS 101, World Civilizations: Beginnings to 1500 C.E.
HIS 102, World Civilizations: 1500 to the present
PHI 151, Introduction to Philosophy
PHI 171, Ethics and Good Living
REL 131, Comparative Religion

GEC 04. Aesthetic Values (3 hours)
Select 1 course:

ART 130, Art Appreciation
DAN 130, Dance Appreciation
MUS 165, The Enjoyment of Music
THE 100, Theatrical Expressions

GEC 05. Social and Behavioral Sciences (6 hours)
Select 2 courses:

ANT 101, The Human Experience: A Global Perspective on Human Diversity
COH 100, Concepts of Wellness
ECO 101, Basic Economics
GHY 101◊, World Geography: Dynamics of a Changing Earth
PS 101, American Government
PSY 110, General Psychology
SOC 101, Understanding Society: Principles of Sociology

GEC 06. Computer Competency Requirement* (4 hours)
CSC 101/101L, Computer Science I and Computer Science I Laboratory

GEC 07. Writing-Intensive Requirement* (3 hours)
Any upper-level writing-intensive course.
Recommended are MAT 392, Undergraduate Research in Mathematics or ENG 333, Technical Writing

GEC 08. Speaking-Intensive Requirement* (3 hours)
Select one course from the following list.

CMS 111, Oral Communication;
CMS 305, Interpersonal Communication;
CMS 320, Business and Professional Speaking;
CMS 330, Small-Group Communication;

GEC 09. Capstone Requirement* (Major Area)
MAT 481, History of Mathematics
Must be taken Senior Year

*This course satisfies both the GEC requirement and a program requirement for this major.
**These GEC courses are recommended by this major.
***This course does not satisfy prerequisites for any other mathematics course.
◊ GEC restrictions apply; see the Undergraduate Bulletin.
GEC 06 - GEC 09 courses are specific to the major.
For full description of the GEC, see the Undergraduate Bulletin.

PROGRAM CURRICULUM
DEG 01. Major Area of Study Requirements (39 hours)
01. MAT 168, Calculus II with Analytic Geometry
02. MAT 169, Calculus III with Analytic Geometry
03. MAT 280, Calculus IV with Analytic Geometry
04. MAT 320, Probability and Mathematical Statistics I
05. MAT 326, Introduction to Linear Algebra
06. MAT 340, Discrete Mathematics
07. MAT 423, Modern Algebra I
08. MAT 441, Introduction to Real Analysis I
09. MAT 481, History of Mathematics (Capstone)
10. Select one course from the following list:
MAT 305, Mathematical Computing I;
MAT 460, Numerical Analysis I

11. Select 12 hours from Department of Mathematics courses except MAT 090-280, 305-410, 430, 431, 457/L, 489, and 490. These 12 hours MUST include at least one course from each of the following groups:
Group I (Analysis & Differential Equations)
MAT 285, Introduction to Differential Equations I; MAT 415, Differential Equations and Special Functions; MAT 417, Introduction to Partial Differential Equations; MAT 436, Theory of Functions of a Complex Variable; MAT 442, Introduction to Real Analysis II
Group II (Numerical Methods, Optimization, Probability & Statistics)
MAT 418, Linear Programming; MAT 419, Optimization in Mathematical Programming; MAT 420, Probability and Mathematical Statistics II; MAT 460, Numerical Analysis I; MAT 461, Numerical Analysis II
Group III (Algebra, Number Theory, & Discrete Mathematics)
MAT 421, Number Theory; MAT 424, Modern Algebra II; MAT 426, Advanced Linear Algebra; MAT 437, Graph Theory; MAT 439, Combinatorics

DEG 02. Additional Requirements (5 hours)
PHY 201/L General Physics I with Calculus

DEG 03. Minor Area of Study (18 hours, Optional)
Choose electives as needed.

DEG 04. Electives
Choose electives as needed with advisor's approval.

Table 1: Degree Requirements for MATBS

Other Requirements. A student must maintain a 2.0 GPA to graduate with a Mathematics BS degree. In addition, no mathematics or computer science course in which a student receives a grade less than C will count toward the major.

Cumulative Credit Hour Requirements In addition to the course requirements for the General Education and Program Curriculums, a student must also satisfy the following cumulative credit hour requirements. In particular, transfer students should be aware of these degree requirements when developing their plan of study.

1. Hours to Degree: at least 124 hours are needed to graduate with either a Mathematics or Mathematics Licensure BS degree.
2. Hours at Senior College: at least 62 hours applied to the major must be earned from a senior college.
3. Hours at 300-level: at least 45 hours must be a result of taking courses at the 300-level or above.
4. Residence hour requirements:
   (a) At least 25% of the credit hours needed for the degree must be from The University of Southern Mississippi.
   (b) At least 12 hours in the major area at the 300/400 level, including the capstone course, must be from The University of Southern Mississippi.
   (c) At least 21 of the last 30 hours of coursework must be from The University of Southern Mississippi.

2.3 Degree Requirements: Mathematics (Licensure) BS

The table below outlines the degree requirements for a Mathematics (Licensure) BS degree.

GENERAL EDUCATION CURRICULUM
GEC 01. Written Communication (6 hours)
01. ENG 101, Composition One
02. ENG 102, Composition Two

GEC 02. Natural Science & Mathematics (11 hours minimum)
01. *Science Requirement (8 hours minimum)*
Select 2 courses with labs:

AST 111/L**, General Astronomy I
AST 112/L**, General Astronomy II
BSC 103/L◊**, Biology and Society
BSC 110/L◊**, Principles of Biological Science I
BSC 111/L◊**, Principles of Biological Science II
BSC 250/L**, Human Anatomy and Physiology I
BSC 251/L**, Human Anatomy and Physiology II
CHE 104/L**, Chemistry and Our Environment
CHE 106/L**, General Chemistry I
CHE 107/L**, General Chemistry II
GHY 104/L◊, Weather and Climate
GHY 105/L◊, Landforms, Hydrology and Biogeography
GLY 101/L**, Physical Geology
GLY 103/L**, Historical Geology
MAR 151/L**, Introduction to Ocean Science
PHY 103/L, Introductory Physics
PHY 111/L, General Physics I
PHY 112/L, General Physics II
PHY 201/L*, General Physics I with Calculus (Required for this Major)
PHY 202/L**, General Physics II with Calculus
PSC 190/L, Living in a Material World

02. *Mathematics Requirement (3 hours)*
Select 1 course:

MAT 100***, Quantitative Reasoning
MAT 101, College Algebra
MAT 167*, Calculus I with Analytic Geometry

GEC 03. Humanities (9 hours)
01. ENG 203, World Literature
02. HIS 101, World Civilizations: Beginnings to 1500 C.E.
03. HIS 102, World Civilizations: 1500 to the present

GEC 04. Aesthetic Values (3 hours)
Select 1 course:

ART 130, Art Appreciation
DAN 130, Dance Appreciation
MUS 165, The Enjoyment of Music
THE 100, Theatrical Expressions

GEC 05. Social and Behavioral Sciences (6 hours)
01 PSY 110, General Psychology
02 Select 1 course:

ANT 101, The Human Experience: A Global Perspective on Human Diversity
COH 100, Concepts of Wellness
ECO 101, Basic Economics
GHY 101◊, World Geography: Dynamics of a Changing Earth
PS 101, American Government
SOC 101, Understanding Society: Principles of Sociology

GEC 06. Computer Competency Requirement* (4 hours)
CSC 101/101L, Computer Science I and Computer Science I Laboratory

GEC 07. Writing-Intensive Requirement* (Major Area)
MAT 481, History of Mathematics

GEC 08. Speaking-Intensive Requirement* (3 hours)
CMS 111, Oral Communication

GEC 09. Capstone Requirement* (Major Area)
01. MAT 489, Student Teaching in Mathematics I
02. MAT 490, Student Teaching in Mathematics II
Can only be taken after all coursework is completed.

*This course satisfies both the GEC requirement and a program requirement for this major.
**These GEC courses are recommended by this major.
***This course does not satisfy prerequisites for any other mathematics course.
◊ GEC restrictions apply; see the Undergraduate Bulletin.
GEC 06 - GEC 09 courses are specific to the major.
For full description of the GEC, see the Undergraduate Bulletin.

PROGRAM CURRICULUM
DEG 01. Major Area of Study Requirements (42 hours)

01. MAT 168, Calculus II with Analytic Geometry
02. MAT 169, Calculus III with Analytic Geometry
03. MAT 280, Calculus IV with Analytic Geometry
04. MAT 285, Introduction to Differential Equations I
05. MAT 309, Mathematics for Elementary Teachers II
06. MAT 315, Technology in Secondary Mathematics Teaching
07. MAT 320, Probability and Mathematical Statistics I
08. MAT 326, Introduction to Linear Algebra
09. MAT 340, Discrete Mathematics
10. MAT 370, Introductory Geometry
11. MAT 420, Probability and Mathematical Statistics II
12. MAT 423, Modern Algebra I
13. MAT 481, History of Mathematics (WI)
14. Select 3 hours from Department of Mathematics courses except MAT 090-410, 430, 431, 457/L, 489, and 490.

DEG 02. Additional Requirements (5 hours)

01. PHY 201 - General Physics I with Calculus
02. PHY 201L - General Physics I with Calculus Laboratory

DEG 03. Teacher Licensure Requirements (35 hours)
Certain courses are restricted; Gold Card required. See Undergraduate Bulletin for details.

01. CIS 302, Explorations in the Mathematics Classroom
02. CIS 313, Principles of Teaching High School
03. MAT 220, Explorations in the Mathematics Classroom
04. MAT 457/L, Methods in Mathematics-Secondary
05. MAT 489, Student Teaching in Mathematics I (Capstone)
06. MAT 490, Student Teaching in Mathematics II (Capstone)
07. PSY 374, Educational Psychology
08. REF 400, Public Education in the United States
09. REF 469, Tests and Measurements
10. SPE 400, Psychology & Education of Exceptional Children
11. Teacher education majors are required to take Praxis II content and PLT tests and have scores reported to Southern Miss (code #1479) prior to graduation.

DEG 04. Electives
Choose electives as needed with advisor's approval.

Table 2: Degree Requirements for MATLBS

Other Requirements. To obtain a Mathematics Licensure BS degree, students must additionally apply for admission into the licensure program. Until successful admission, certain classes (in DEG 3) are restricted. To apply for admission into the licensure program, the following requirements (taken from the *Undergraduate Bulletin*) must be met:

1. one of the following acceptable exam benchmarks must be met:
   (a) an ACT composite score of 21 or higher, with no scale score below 18,
   (b) a SAT score of 990 (verbal and quantitative) upon entrance into college
   (c) acceptable scores on the Core Academic Skills for Educators exam (CORE); Reading Test, Code 5712: a score of at least 156, Writing Test, Code 5722: a score of at least 162, Mathematics Test, Code 5732: a score of at least 150
2. a minimum grade point average on the 44-semester-hour general education core curriculum of 2.75;
3. a C average in freshman English Composition;
4. good academic standing at the University of Southern Mississippi.
   A student on probation, probation continued or suspension status will not be admitted to teacher education until the transcript reflects good academic standing;
5. clear background check.
   Each student who applies for admission to a teacher education program must undergo a background check when applying for the Gold Card. Background checks are done via a system selected by the Southern Mississippi Professional Education Council. Students who pass the background checking process will be issued a background check badge and considered eligible for admission to teacher education pending satisfaction of other admission requirements.
6. subscribe to the Tk20 Assessment System.
   Tk20 provides an electronic portfolio and storage system for students as well as tracks, stores, retrieves and analyzes data for accreditation purposes.

After admission to a professional education program, the following requirements must be met to continue in the program:

1. A grade of C or better in all content courses in the academic major as well as all professional education courses with an overall grade point average of 2.50;

2. fulfillment of major requirements in subject area;
3. completion of professional education courses required by the major;
4. take Praxis II content and PLT tests and have scores reported to the University of Southern Mississippi (code #1479) prior to graduation.

A minimum of 30 clock hours of clinical experience is required prior to teacher candidacy (15 hours of observation and 15 hours of practicum).

Requirements for professional education programs are subject to modification. For current program information, students should contact the Educator Licensure Office for the university. Mississippi Department of Education licensure requirements supersede the program requirements listed here or in the Undergraduate Bulletin. Mandated changes in program requirements will be communicated through the candidate's department.

Cumulative Credit Hour Requirements In addition to the course requirements for the General Education and Program Curriculums, a student must also satisfy the following cumulative credit hour requirements. In particular, transfer students should be aware of these degree requirements when developing their plan of study.

1. Hours to Degree: at least 124 hours are needed to graduate with either a Mathematics or Mathematics Licensure BS degree.
2. Hours at Senior College: at least 62 hours applied to the major must be earned from a senior college.
3. Hours at 300-level: at least 45 hours must be a result of taking courses at the 300-level or above.
4. Residence hour requirements:
   (a) At least 25% of the credit hours needed for the degree must be from The University of Southern Mississippi.
   (b) At least 12 hours in the major area at the 300/400 level, including the capstone course, must be from The University of Southern Mississippi.
   (c) At least 21 of the last 30 hours of coursework must be from The University of Southern Mississippi.

2.4 Course Requirements: Minor in Mathematics

Students pursuing a minor in mathematics must complete a minimum of 18 hours of mathematics courses beyond MAT 167. At least 6 hours must be taken at The University of Southern Mississippi. Only those courses that count toward the major in mathematics can count in the minor in mathematics, with the exception of MAT 430 and 431 (Advanced Engineering Mathematics I and II), which count in the minor but not in the major. **Note:** *Although MAT 167 is required for a major in mathematics, it is part of the General Education Curriculum requirements and is not considered to count towards a minor in mathematics.* Students seeking a minor in mathematics are encouraged to consult a faculty advisor in the Department of Mathematics.

2.5 Course Requirements: Mathematics Endorsement

To earn an add-on secondary mathematics endorsement, the following 21 hour program of study has been approved by the State Department of Education. A grade of C or better is required in each course.

- Calculus (Choose 6 credit hours from the following):
  - MAT 167 - Calculus I with Analytic Geometry
  - MAT 168 - Calculus II with Analytic Geometry
  - MAT 169 - Calculus III with Analytic Geometry
- Advanced Level Algebra
  - MAT 326 - Introduction to Linear Algebra
- Statistics
  - MAT 115 - Elementary Statistics
- Geometry
  - MAT 370 - Introductory Geometry
- Trigonometry
  - MAT 103 Plane Trigonometry
- Discrete Mathematics
  - MAT 340 Discrete Mathematics

2.6 Sample Programs of Study

The following section contains sample programs of study, which are to be used as guidelines only to aid students in completing all degree requirements in the course of 4 years.

2.6.1 Mathematics BS

Freshmen 1st semester	**HRS**		**Freshmen 2nd semester**	**HRS**	
MAT 340	3	DEG1	MAT 168	3	DEG1
Elective	3	DEG4	MAT 326	3	DEG1
ENG 101	3	GEC1	Elective	3	DEG3
MAT 167	3	GEC2	ENG 102	3	GEC1
Science and Lab	4	GEC2	Select 1: ANT 101, COH 100, ECO 101, GHY 101, PS 101, PSY 110, SOC 101	3	GEC5
TOTAL	16		TOTAL	15	
Sophomore 1st semester	**HRS**		**Sophomore 2nd semester**	**HRS**	
MAT 169	3	DEG1	MAT 280	3	DEG1
ENG 203	3	GEC3	Elective	3	DEG4
Select 1: HIS 101, HIS 102, PHI 151, PHI 171, or REL 131	3	GEC3	Select 1: HIS 101, HIS 102, PHI 151, PHI 171, or REL 131	3	GEC3
Select 1: ANT 101, COH 100, ECO 101, GHY 101, PS 101, PSY 110, SOC 101	3	GEC5	PHY 201/L	5	GEC2
CSC 101/L	4	GEC6	Select 1: ART 130, DAN 130, MUS 165, THE 100	3	GEC4
TOTAL	16		TOTAL	17	
Junior 1st semester	**HRS**		**Junior 2nd semester**	**HRS**	
MAT 320	3	DEG1	MAT Electives (see plan for available options)	6	DEG1
MAT 423	3	DEG1	Electives	3	DEG4
MAT 305 or MAT 460	3	DEG2	MAT 392 or ENG 333 (or approved WI)	3	GEC7
Electives	6	DEG4	Select 1: MAT 392, CMS 111, CMS 305, CMS 320, CMS 330	3	GEC8
TOTAL	15		TOTAL	15	
Senior 1st semester	**HRS**		**Senior 2nd semester**	**HRS**	
MAT 441	3	DEG1	MAT 481	3	DEG1/GEC9
MAT Electives (see plan for available options)	3	DEG1	MAT Electives (see plan for available options)	3	DEG1
Electives	9	DEG3	Electives	9	DEG3
TOTAL	15		TOTAL	15	

Table 3: Course By Semester Guide for MATBS

2.6.2 Mathematics (Licensure) BS

Freshmen 1st semester	**HRS**		**Freshmen 2nd semester**	**HRS**	
MAT 340	3	DEG1	MAT 168	3	DEG1
ENG 101	3	GEC1	MAT 326	3	DEG1
MAT 167	3	GEC2	ENG 102	3	GEC1
Science and Lab	4	GEC2	HIS 101 or 102	3	GEC3
HIS 101 or 102	3	GEC3	Select 1: ANT 101, COH 100, ECO 101, GHY 101, PS 101, SOC 101	3	GEC5
TOTAL	16		TOTAL	15	
Sophomore 1st semester	**HRS**		**Sophomore 2nd semester**	**HRS**	
MAT 169	3	DEG1	MAT 280	3	DEG1
ENG 203	3	GEC3	MAT 285	3	DEG1
PSY 110	3	GEC5	MAT 220	1	DEG3
CSC 101/L	4	GEC6	PHY 201/L	5	GEC2
CMS 111	3	GEC8	Select 1: ART 130, DAN 130, MUS 165, THE 100	3	GEC4
TOTAL	16		TOTAL	15	
Junior 1st semester	**HRS**		**Junior 2nd semester**	**HRS**	
MAT 320	3	DEG1	MAT 309	3	DEG1
MAT 370	3	DEG1	MAT 420	3	DEG1
MAT 315	3	DEG3	MAT 423	3	DEG1
PSY 374	3	DEG3	MAT 481	3	DEG1/GEC7
REF 469	3	DEG3	CIS 302	3	DEG3
			CIS 313	3	DEG3
TOTAL	15		TOTAL	18	
Senior 1st semester	**HRS**		**Senior 2nd semester**	**HRS**	
MAT Electives (see plan for available options)	3	DEG1	MAT 489	6	DEG3/GEC9
MAT 457/L	4	DEG3	MAT 490	6	DEG3/GEC9
REF 400	3	DEG3			
SPE 400	3	DEG3			
Electives	4	DEG4			
TOTAL	17		TOTAL	12	

Table 4: Course By Semester Guide for MATLBS

Note that, to follow this program of study, students must successfully apply for admission into the licensure program by the beginning of their junior year.

2.6.3 Transfer: Mathematics BS

USM maintains a 2+2 agreement with Mississippi Community/Junior Colleges. The following program of study is based on this agreement.

Courses at Mississippi Community/Junior College					
Freshmen 1st semester	**HRS**		**Freshmen 2nd semester**	**HRS**	
ENG 1113 (ENG 101)	3	GEC1	MAT 1623 (MAT 168)	3	DEG1
HIS 1113/HIS 1163 (HIS 101)	3	GEC3	ENG 1123 (ENG 102)	3	GEC1
MAT 1613 (MAT 167)	3	GEC2	HIS 1123/HIS 1173 (HIS 102)	3	GEC3
Science and Lab (CHE 1214, CHE 1224, BIO 1134, BIO 1144, PHY 2514, PHY 2524)	4	GEC2	SOC 2213 (SOC 101)	3	GEC5
			CSC 2134 (CSC 101/L)	4	GEC6
Select 1: ART 1113, MUS 1113, DAN 1113, SPT 2233	3	GEC4			
TOTAL	17		TOTAL	16	
Sophomore 1st semester	**HRS**		**Sophomore 2nd semester**	**HRS**	
MAT 2613 (MAT 169)	3	DEG1	MAT 2623 (MAT 280)	3	DEG1
MAT 2913 (MAT 285)	3	DEG1	Math Elective	3	DEG3
ENG 2423 (ENG 203)	3	GEC3	PHY 2514 (PHY 201/L)	5	GEC2
Select 1: PSC 1113, PSY 1513	3	GEC5	SPT 1113 (CMS 111)	3	GEC8
TOTAL	12		TOTAL	14	
Courses at the University of Southern Mississippi					
Junior 1st semester	**HRS**		**Junior 2nd semester**	**HRS**	
MAT 340	3	DEG2	MAT 392 or ENG 333 (or approved WI)	3	GEC7
MAT 326	3	DEG2			
MAT 305 or MAT 460	3	DEG2	Electives	3	DEG4
Electives	6	DEG4	MAT Electives (see plan for available options)	9	DEG1
TOTAL	15		TOTAL	15	
Senior 1st semester	**HRS**		**Senior 2nd semester**	**HRS**	
MAT 320	3	DEG1	MAT 481	3	GEC9/DEG1
MAT 423	3	DEG1	Electives	6	DEG4
MAT 441	3	DEG1	MAT Electives (see plan for available options)	6	DEG1
Electives	3	DEG4			
MAT Electives (see plan for available options)	3	DEG1			
TOTAL	15		TOTAL	15	

Table 5: Course By Semester Guide for MATBS (Transfer)

2.6.4 Transfer: Mathematics (Licensure) BS

USM maintains a 2+2 agreement with Mississippi Community/Junior Colleges. The following program of study is based on this agreement.

Courses at Mississippi Community/Junior College					
Freshmen 1st semester	**HRS**		**Freshmen 2nd semester**	**HRS**	
ENG 1113 (ENG 101)	3	GEC1	MAT 1623 (MAT 168)	3	DEG1
MAT 1613 (MAT 167)	3	GEC2	ENG 1123 (ENG 102)	3	GEC1
Science and Lab (CHE 1214, CHE 1224, BIO 1134, BIO 1144, PHY 2514, PHY 2524)	4	GEC2	HIS 1163 (HIS 101) or HIS 1173 (HIS 102)	3	GEC3
HIS 1163 (HIS 101) or HIS 1173 (HIS 102)	3	GEC3	Select 1: SOC 2213 GEO 113, SOC 2113	3	GEC5
Select 1: ART 1113, MUS 1113, DAN 1113, SPT 2233	3	GEC4			
TOTAL	16		TOTAL	12	
Sophomore 1st semester	**HRS**		**Sophomore 2nd semester**	**HRS**	
MAT 2613 (MAT 169)	3	DEG1	MAT 2623 (MAT 280)	3	DEG1
ENG 2423 (ENG 203)	3	GEC3	MAT 2913 (MAT 285)	3	DEG1
PSY 1513 (PSY 110)	3	GEC5	Electives	4	DEG4
SPT 1113 (CMS 111)	3	GEC8	PHY 2514 (PHY 201/L)	5	GEC2
TOTAL	12		TOTAL	15	
Courses at the University of Southern Mississippi					
Junior 1st semester	**HRS**		**Junior 2nd semester**	**HRS**	
MAT 305	3	DEG1	MAT 309	3	DEG1
MAT 315	3	DEG1	MAT 320	3	DEG1
MAT 326	3	DEG1	MAT 370	3	DEG1
MAT 340	3	DEG1	MAT 423	3	DEG1
MAT 220	1	DEG3	MAT 481	3	DEG1/GEC7
PSY 374	3	DEG3	CIS 313	3	DEG3
REF 469	3	DEG3			
TOTAL	19		TOTAL	18	
Senior 1st semester	**HRS**		**Senior 2nd semester**	**HRS**	
MAT Electives (see plan for available options)	3	DEG1	MAT 489	6	DEG3/GEC9
MAT 420	3	DEG1	MAT 490	6	DEG3/GEC9
MAT 457/L	4	DEG3			
CIS 302	3	DEG3			
REF 400	3	DEG3			
SPE 400	3	DEG3			
TOTAL	19		TOTAL	12	

Table 6: Course By Semester Guide for MATLBS (Transfer)

3 Undergraduate Policies (Departmental)

3.1 Departmental Scholarships

Each year, the Department of Mathematics offers scholarships for undergraduates pursuing a Mathematics or Mathematics Licensure BS degree. A Scholarship Committee composed of faculty members is appointed to review scholarship applications and determine the applicants which best fulfill the requirements of each scholarship. Though scholarship requirements vary, the Scholarship Committee expects that each recipient will be a full time student at the University of Southern Mississippi during the terms of the award. Additionally, a recipient's program of study should demonstrate significant depth in mathematics relative to his or her collegiate classification. Further details regarding scholarships (including requirements, application materials, and deadlines) are available on the website maintained by the department.

3.2 Comprehensive Exam

All students pursuing a Mathematics BS or Mathematics Licensure BS are required to take a comprehensive exam, namely the ETS Major Field Test. Currently, the test is administered to students in the semester that they are enrolled in MAT 423. Details regarding the administration of the exam will be communicated through the MAT 423 instructor. Honors students should also read the subsection entitled "Comprehensive Exam" in the section titled "Guidelines for Mathematics Honors Students."

3.3 Credit by Examination

The University of Southern Mississippi will allow students to earn credit by examination through Advanced Placement (AP) testing, the College-Level Examination Program (CLEP), or International Baccalaureate (IB) examination. All AP, CLEP, or IB scores should be submitted to Admissions for credit evaluation. The following table indicates the amount of credit which can be earned.

3.4 Mathematics Placement Test

Students which do not meet a course prerequisite may use results of a placement test in lieu of the prerequisite. The results of the test will be one of the criteria that will determine in which class the student may enroll.

On the Hattiesburg campus, interested students should contact the office of the Department of Mathematics to schedule a Compass testing time. On the Gulf Coast campus,

Examination	Score	Credit
AP Course: Calculus AB	3	MAT 128 (3 hours)
AP Course: Calculus AB	4-5	MAT 128 & one of MAT 102, 114, 167 (6 hours)
AP Course: Calculus BC	3	MAT 102 or MAT 114 (3 hours)
AP Course: Calculus BC	4-5	MAT 167 & 168 (6 hours)
CLEP: College Algebra	50	MAT 101 (3 hours)
CLEP: Calculus, with Elementary Functions	50	MAT 167 (3 hours)
CLEP: Calculus, with Elementary Functions	*	MAT 167 & MAT 168 (6 hours)
IB: Advanced Mathematics	4	MAT 167 (3 hours)
IB: Advanced Mathematics	5-7	MAT 167 & MAT 168 (6 hours)

Table 7: Credit By Examination Table

Course	Prerequisite course "C" or better	ACT Math sub-score	SAT Math sub-score (score in parentheses if taken before 5/1/16)	Compass Placement Test Module Scores
MAT 100 MAT 101 MAT 101E MAT 115	MAT 099 (or equivalent)	≥ 20	≥ 520 (490)	Algebra ≥ 40
MAT 102 MAT 103 MAT 114 MAT 128	MAT 101 (or equivalent)	≥ 24	≥ 580 (560)	Algebra ≥ 42 College Algebra ≥ 52
MAT 167	Mat 103, Mat 128, (or equivalent)	≥ 26	≥ 620 (600)	Algebra ≥ 42 College Algebra ≥ 52 Trigonometry ≥ 46

Table 8: Placement Test Prerequisites

contact Dr. Harris (John.m.Harris@usm.edu) or Ms. Naquin (Marlene.Naquin@usm.edu). Students will need to bring their student ID or something showing their name and ID number along with a photo ID. Appointments to take the test may be set up at any time during the semester.

3.5 Honors

Students seeking to graduate with Latin Honors in mathematics (through the Honors College) must meet all requirements for Senior Honors as described in the Honors College Handbook. In addition, students must meet the departmental requirements as set forth below. Please be particularly attentive of deadlines for the completion of the comprehensive exam, the prospectus, the thesis, and the thesis defense. A timeline is available to assist students in planning their course of study.

Nothing in this document overrides requirements of the Honors College or of the College of Science and Technology. Should any conflict exist, priority lies with the guidelines of each College.

3.5.1 Honors Committee

An Honors Committee composed of 3-4 faculty members is responsible for designing and administering the Honors Comprehensive Examination, reviewing the Prospectus, and hearing the defense of the Honors Thesis. The Committee will also periodically review the guidelines and, if necessary, make changes.

3.5.2 Dual majors

Some projects successfully integrate research in different fields, such as mathematics and music, or mathematics and physics. In such cases, it is very important that the advisor and the student communicate this intent with the department at a very early stage.

Students who are dual majors in mathematics and another field may choose to pursue Latin Honors in the other field. In this case, the student should follow the guidelines of that department. The Department of Mathematics cannot evaluate, nor endorse, research in other specialties.

3.5.3 Comprehensive Examination

In accordance with the guidelines of the Honors College, students must take a comprehensive examination before submitting their thesis. The student should schedule her or his first attempt at the exam at least one semester *before* the student intends to graduate.

Honors students are expected to demonstrate a mastery of mathematics on the Comprehensive Examination. At the present time, the Honors Committee has decided to measure this mastery using the ETS Major Field Test. This test is required of all students taking MAT 423. A student is deemed to have passed the exam if she or he performs above the

mean score of all students taking it in that semester. If no students take the exam that semester, the previous semester's mean will be used.

In case of an unsatisfactory performance, the committee may reschedule the examination once. At least one semester should elapse before the examination is rescheduled.

3.5.4 Thesis Advisor

The student should select a mathematics faculty advisor who will direct the research work for the Honors Thesis. Because students are expected to begin research during the Junior year, while taking HON 301 (Prospectus Writing), a student should have found an advisor no later than the sophomore year.

3.5.5 Prospectus

The Honors College requires Senior Honors students to complete HON 301 (Prospectus Writing), and recommends that it be completed during the first semester of the junior year. In order to allow adequate time for writing the thesis, it is normally assumed that the Prospectus wil have been approved by the end of the first semester of the junior year. The Prospectus should be prepared under the direction of a thesis advisor.

Each student presenting a Prospectus in mathematics during a semester, along with his or her thesis advisor, will meet with the departmental Honors Committee. The purposes of this prospectus review are to establish realistic objectives for the Honors Thesis and to determine appropriate prerequisites. It is not the intent of the committee to impose inflexible guidelines for the thesis. The prospectus review should occur no later than four weeks prior to the end of the semester in which the Prospectus will be submitted to the Honors College.

Although the Honors College does not require the signatures of either the Department Chair nor of the Honors Committee, advisors are urged not to neglect their duty of informing the Committee of their students' projects and progress.

3.5.6 Thesis

After the Prospectus has been approved, two complete semesters should be allowed for writing the thesis (normally the 2nd semester of the junior year and the 1st semester of the senior year). A first draft would be presented to the faculty advisor by the end of the first semester. The student should obtain a copy of the Guide for Writing the Senior Thesis from the Honors College. (The Honors College requires that a draft of the thesis be approved no later than the five weeks before the end of the semester in which the student will graduate.)

Faculty are reminded that undergraduate students do not have a good sense of how long a research project will take, or how much effort and dedication it requires. The Honors Committee urges advisors to meet frequently with their students, *at least* once a week.

3.5.7 Thesis Defense

After the thesis advisor has approved the thesis, the student should provide a copy of the thesis to each member of the mathematics honors committee. The committee will review the thesis, and within the next two weeks of regularly scheduled classes, will approve the scheduling of an oral defense, or else will return written comments detailing aspects of the thesis that need to be addressed prior to the scheduling of that defense. If a thesis is returned for further work, the process will repeat until the thesis is deemed acceptable by the committee.

Once the committee accepts the thesis, the student, in conjunction with his or her advisor, will schedule an oral defense of the thesis. During this defense, the student will present his or her results to the committee, and the student will be expected to answer questions pertaining to the thesis. If the committee still feels further work is needed, the student will be given detailed advice by the committee, and upon the completion of the committee's recommendations, another oral defense can be scheduled if the committee deems it desirable. Upon successful completion of the oral defense, the committee will provide the chair of the department with written notice that the thesis has been approved, and that the thesis may be signed.

The department chair should not approve a thesis without the committee's approval. Students who do not communicate with the Honors Committee according to the schedule given here risk not graduating with Latin Honors.

The Honors College requires that a draft of the thesis must be submitted to the thesis advisor and to the Senior Honors Coordinator at least five weeks prior to the end of the semester of graduation, and that the completed thesis be submitted to the thesis advisor at least three weeks prior to the end of the semester. In order for the departmental honors committee to have adequate time to review the thesis, the department requires that the student deliver a draft of the thesis to the thesis advisor, and with the advisor's approval, to the committee at least seven weeks prior to the end of the semester in which the student will graduate.

Students should consult with their advisors on how to prepare a mathematical document, and which software to use. The committee urges students to avoid packages such as Microsoft Word that do not produce high-quality mathematical output; the use of packages such as LaTeXor Lyx is preferred.

A comprehensive Honors Thesis/MS Thesis/PhD Disseration package is also supported and provided by the Department of Mathematics. The package contains tutorials and examples on various common environments used in LaTeX, including the use of bibliography databases, indices, cross referencing and the use of figures and images in documents.

In addition to style manuals recommended by the Honors College, the following manuals which are specifically concerned with mathematical manuscripts should be consulted

- *Mathematical Writing*, Donald E. Knuth, Tracy Larrabee, and Paul M. Roberts, Mathematical Association of America, Washington, D.C. (1990); and,
- *Writing Mathematics Well*, Leonard Gilman, Mathematical Assocation of America, Washington, D.C (1987).

The following texts contain references and/or tutorials for LaTeX.

- *First steps in LaTeX*, George Grätzer, Birkhäuser, Boston (1999)
- *The LaTeXCompanion*, Michel Goossens, Frank Mittelbach, and Alexander Samarin, Addison, Reading, Mass. (1994);
- *Learning LaTeX*, David Griffiths and Desmond Higham, SIAM, Philadelphia (1997); and,
- *Math into LaTeX*, 3rd Edition, George Grätzer, Birkhäuser-Springer, Boston (2004).

3.5.8 Timeline for Mathematics Honors Students

- Freshman and Sophomore Years:
  - Complete core courses in calculus, differential equations, linear algebra and discrete mathematics.
  - Interview faculty members to learn about their research interests and their background directing undergraduate research. Select a thesis advisor in mathematics.
- Junior Year:
  - 1st Semester:
    Select a thesis advisor in mathematics, if not done already.
    Enroll in HON 301 (Prospectus Writing).
    Meet with Department Honors Committee.
    Complete and submit Prospectus.
  - 2nd Semester:
    Enroll in HON 301 and complete Prospectus, if not done in 1st semester.
    Enroll in MAT 492H under your advisor's name.
- Senior Year:
  - 1st Semester:
    Petition to take the Comprehensive exam, and pass it.
    Complete first draft of thesis by mid-semester.
    Complete final draft of thesis.
    Enroll in MAT 492H under your advisor's name.
  - 2nd Semester:
    Petition to take the Comprehensive exam, and pass it, if not done in 1st semester.
    Submit final draft of thesis to departmental Honors Committee at least seven weeks before the end of the semester.
    Defend thesis.
    Submit final, signed thesis to Honors College at least three weeks before the end of the semester.

Although there is some flexibility with the timeline, the following must be observed:

- The Prospectus can be submitted no later than one semester prior to graduation.
- The committee must be able to review the thesis before the oral defense. Thus the student must submit a thesis no later than seven weeks before graduation.
- Since the Honors College requires the thesis to be signed and submitted at least three weeks before the end of the semester, the defense can occur no later than three weeks before graduation.

4 Undergraduate Activities (Departmental)

4.1 Kappa Mu Epsilon

Kappa Mu Epsilon is a national mathematics honor society. Membership requirements include completion of at least three semesters of college work and three college mathematics courses above the level of College Algebra, to include MAT 167, with at least one mathematics course taken at Southern Miss. In addition, GPAs at Southern Miss of at least 3.0 in mathematics and 2.85 overall are required. Initiations are held each spring. Students interested in becoming a part of this group should contact the Department of Mathematics.

4.2 Student Research

Students pursuing a Mathematics BS or a Mathematics Licensure BS are encouraged to engage in active mathematical research. Any student interested in doing so should contact a faculty member in their interest area. Students would then work on mathematics problems under the direction of that faculty member. Many times, such research results in conference presentations and publications in undergraduate research journals. In addition, students who are not enrolled in the honors program may want to consider pursuing an undergraduate thesis through the department. To do so, students should follow the guidelines listed in the section *Honors*.

In addition to on-campus opportunities, the National Science Foundation (NSF) funds many Research Experience for Undergraduates (REU) programs. More information regarding REU programs can be found on the website for the NSF. Interested students should contact a faculty member on or before the fall semester of their Junior year.

The following websites can be used as resources for finding further research or internship opportunities.

1. http://www.ams.org/profession/student
   The student page for the AMS (American Mathematical Society).

2. http://www.maa.org/students/
   The student page for the MAA (Mathematical Association of American).

3. http://www.siam.org/students/
   The student page for SIAM (Society for Industrial and Applied Mathematics).

4. http://www.nsf.gov/crssprgm/reu/
   The REU site for the NSF (National Science Foundation)

5. http://www.nsa.gov/careers/opportunities_4_u/students/
   The student page for the NSA (National Security Agency)

6. http://intern.nasa.gov/
   The NASA page for internships, scholarships, and other opportunities for students

A Courses and Course Schedules

This section contains information regarding courses and course scheduling in order to assist students in developing their plan of study.

A.1 Undergraduate Courses

A course description for each undergraduate course offered in the Department of Mathematics is given below. For the latest official course descriptions of mathematics courses offered at USM, see the Undergraduate Bulletin. **Nothing in this document overrides the bulletin,** but in case of conflict please consult with the Chair of the Department.

MAT 099. Intermediate Algebra. 3 hrs.
Prerequisite(s): None.
Required of all entering freshmen with a substandard ACT mathematics score; does not satisfy any university core or degree requirements; arithmetic operations review, basic operations on polynomials, solving linear and quadratic equations and graphing linear and quadratic functions (CC 1233)

MAT 100. Quantitative Reasoning. 3 hrs.
Prerequisite(s): ACT Math subscore $\geq$ 20 or C or higher in MAT 099.
Logic, probability, finance. Satisfies no prerequisite for any other math course.

MAT 101. College Algebra. 3 hrs.
Prerequisite(s): Math ACT $\geq$ 20 or a grade of C or better in MAT 099.
Functions and graphs, linear equations and inequalities, non-linear equations, including exponential and logarithmic equations (CC 1313)

MAT 101E. Explorations in College Algebra. 3 hrs.
Prerequisite(s): Math ACT $\geq$ 20 or a grade of C or better in MAT 099.
Functions and graphs, linear equations and inequalities, non-linear equations, including exponential and logarithmic equations; taught using technology and group projects (CC 1313)

MAT 102. Brief Applied Calculus. 3 hrs.
Prerequisite(s): Math ACT $\geq$ 24 or a grade of C or better in MAT 101.
An introduction to differential and integral calculus with applications primarily related to business and finance (CC 1333, 1423, 1513)

MAT 103. Plane Trigonometry. 3 hrs.
Prerequisite(s): Math ACT $\geq$ 24 or a grade of C or better in MAT 101.
Trigonometric functions and their inverses, trigonometric identities and equations, and solutions of triangles (CC 1323)

MAT 114. Calculus for the Arts and Sciences. 3 hrs.

Prerequisite(s): Math ACT $\geq$ 24 or a grade of C or better in MAT 103.

An introduction to functions, graphs, continuity, differential and integral calculus, with applications to the arts and life sciences (A student who receives credit for any other calculus course cannot use this course to satisfy any degree requirements in the College of Science and Technology.)

MAT 128. Precalculus Mathematics. 3 hrs.

Prerequisite(s): Math ACT $\geq$ 24 or a grade of C or better in MAT 101.

Functions, analytic geometry, roots of polynomials and basic concepts of trigonometry

MAT 167. Calculus I with Analytic Geometry. 3 hrs.

Prerequisite(s): Math ACT $\geq$ 26 or a grade of C or better in MAT 103 or MAT 128.

Derivatives and limits, differentiation rules, applications of differentiation (CC 1613)

MAT 168. Calculus II with Analytic Geometry. 3 hrs.

Prerequisite(s): MAT 167.

Integrals, applications of integration, techniques of integration, infinite sequences and series (CC 1623)

MAT 169. Calculus III with Analytic Geometry. 3 hrs.

Prerequisite(s): MAT 168.

Further application of integration, parametric equations, polar coordinates, vectors and the geometry of space, vector functions, partial derivatives (CC 2613)

MAT 210. Mathematics for Elementary Teachers I. 3 hrs.

Prerequisite(s): MAT 101.

Problem solving, sets, whole numbers and whole numbers operations, number systems and operations including different bases and contributions from diverse cultures, number theory, integers and integer operations (Open only to elementary and special education majors.) (CC 1723)

MAT 220. Explorations in the Mathematics Classroom. 1 hr.

Prerequisite(s): None

Ten hours of secondary classroom observations together with five hours of seminar under the direction of a mathematics faculty member

MAT 280. Calculus IV with Analytical Geometry. 3 hrs.

Prerequisite(s): MAT 169.

Multiple integration and vector calculus (CC 2623)

MAT 285. Introduction to Differential Equations I. 3 hrs.

Prerequisite(s): MAT 168.

Linear differential equations, nonlinear differential equations, systems of differential equations, Laplace transforms, and the Frobenius method (series solution).

MAT 305. Mathematical Computing I. 3 hrs.

Prerequisite(s): MAT 280.

Introduction to symbolic mathematical problem solving using computer based systems

MAT 308. Mathematics for Early Childhood Education. 3 hrs.

Prerequisite(s): MAT 210.

Problem solving, ordering, comparing, classifying, numberless, money, time, measurement and geometry (Open only to elementary and special education majors.)

MAT 309. Mathematics for Elementary Teachers II. 3 hrs.

Prerequisite(s): MAT 210.

Problem solving, rational numbers and rational number operations, real numbers, ratios, proportions, percents, statistics and probability (Open only to elementary and special education majors and mathematics licensure majors.)

MAT 310. Mathematics for Elementary Teachers III. 3 hrs.

Prerequisite(s): MAT 210.

Problem solving, logic, basic concepts of 2-dimensional and 3-dimensional geometry, congruence and similarity of triangles and measurement (Open only to elementary and special education majors.)

MAT 315. Technology in Secondary Mathematics Teaching 3 hrs.

Prerequisite(s): MAT 168 and MAT 220.

Exploring technologies specific to secondary mathematics teaching and learning and appropriate use of these technologies in the classroom.

MAT 320. Probability and Mathematical Statistics I. 3 hrs.

Prerequisite(s): MAT 169, 326, and 340.

Discrete distributions, random variables, independence, moment generating functions, continuous distributions and multivariate distributions

MAT 326. Introduction to Linear Algebra I. 3 hrs.

Prerequisite(s): None.

Vector spaces, matrices, linear transformations, systems of linear equations, eigenvalues and eigenvectors

MAT 340. Discrete Mathematics. 3 hrs.

Prerequisite(s): None.

Logic, set theory and selected topics from algebra, combinatorics and graph theory

MAT 370. Introductory Geometry. 3 hrs.

Prerequisite(s): MAT 326 and 340.

Concepts and principles of Euclidean and non-Euclidean geometries in two and three dimensions, axiomatics and proof, coordinate geometry and vectors, congruence and similarity, transformations, concepts and formulas related to two and three-dimensional space. Reasoning and proof, communication, problem solving, connections, representations, and interactive geometry software are integrated throughout the course (Open only to those students preparing to teach mathematics in grades 7-12.)

MAT 392. Undergraduate Research. 3 hrs.

Prerequisite(s): MAT 280, MAT 340, and MAT 326.

Analytical writing and speaking in mathematics. This is designated as a writing-intensive and oral communications course.

MAT 410. Mathematics for Teachers of Junior High School Mathematics. 3 hrs.

Prerequisite(s): None.

The real number system and major subsystems, modular arithmetic, patterns, relations and functions, algebraic expressions and equations, counting techniques and probability; selected topics in geometry including coordinate geometry and transformations (Open only to elementary and special education majors.)

MAT 415. Differential Equations and Special Functions. 3 hrs.

Prerequisite(s): MAT 285 and MAT 326.

Systems of linear differential equations, operator methods, approximating solutions, Laplace transforms and power series

MAT 417. Introduction to Partial Differential Equations. 3 hrs.

Prerequisite(s): MAT 285, 326, and 340.

Integrability conditions, quasilinear equations, applications of physics, classification of second order equations and canonical forms, and separation of variables

MAT 418. Linear Programming. 3 hrs.

Prerequisite(s): MAT 326 and 340.

Convex sets, linear inequalities, extreme-point solutions, simplex procedure and applications

MAT 419. Optimization in Mathematical Programming. 3 hrs.

Prerequisite(s): MAT 280 and 418.

Selected topics in optimization from linear and nonlinear programming

MAT 420. Probability and Mathematical Statistics II. 3 hrs.

Prerequisite(s): MAT 320.

Central limit theorem, estimation and hypothesis tests

MAT 421. Number Theory. 3 hrs.

Prerequisite(s): MAT 326 and 340.

Induction, well-ordering, division algorithm, Euclidean algorithm, Fundamental Theorem of Arithmetic, number theoretic functions and congruences

MAT 423. Modern Algebra I. 3 hrs.

Prerequisite(s): MAT 326 and 340.

Elementary notions in groups, Fundamental Theorem of Finitely Generated Groups, permutation groups, quotient groups, isomorphism theorems and applications of transformation groups

MAT 424. Modern Algebra II. 3 hrs.

Prerequisite(s): MAT 423.

Survey of standard algebraic systems; rings, integral domains, fields, modules, polynomial rings and fields of quotients

MAT 426. Advanced Linear Algebra. 3 hrs.

Prerequisite(s): MAT 326 and 340.

Theory and structure of linear transformations, orthogonality, linear functionals, bilinear and quadratic forms and special matrices

MAT 430. Advanced Engineering Mathematics I. 3 hrs.

Prerequisite(s): MAT 280 and 285.

Introduction to Laplace transforms and Fourier series with emphasis on solving ordinary and simple partial differential equations (Does not count as an upper-level mathematics elective.)

MAT 431. Advanced Engineering Mathematics II. 3 hrs.

Prerequisite(s): MAT 430.

Vector calculus and an introduction to complex variables with emphasis on integral theorems and integration (Does not count as an upper-level mathematics elective.)

MAT 436. Theory of Functions of a Complex Variable. 3 hrs.

Prerequisite(s): MAT 280, 326, and 340.

Complex numbers and functions, limits, continuity, differentiation, analytic functions, branches, contour integration, and series

MAT 437. Graph Theory. 3 hrs.

Prerequisite(s): MAT 326 and 340.

An introduction to graphs and a sampling of their numerous and diverse applications

MAT 439. Combinatorics. 3 hrs.

Prerequisite(s): MAT 169, 326, and 340.

Counting and enumeration techniques, inversion formulas and their applications, and counting schemata relative to permutations of objects

MAT 441. Real Analysis I. 3 hrs.
Prerequisite(s): MAT 280, 326, and 340.
The real numbers, sequences and series, limits, continuous functions, differentiation

MAT 442. Real Analysis II. 3 hrs.
Prerequisite(s): MAT 441.
The Riemann integral, sequences of functions, infinite series, the generalized Riemann Integral, and a glimpse into topology

MAT 457. Methods in Mathematics-Secondary. 3 hrs.
Prerequisite(s): CIS 313, MAT 280, 285, 326, and 340, PSY 374.
A course designed to give the students a knowledge of the objectives, curriculum problems and organization and methods of teaching secondary school mathematics (Does not count as an upper-level mathematics elective.)

MAT 457L. Methods in Mathematics-Secondary Laboratory. 1 hr.
Corequisite(s): MAT 457.
A practicum with a minimum of 15 contact hours in a school setting (Does not count as an upper-level mathematics elective.)

MAT 460. Numerical Analysis I. 3 hrs.
Prerequisite(s): MAT 280, 326, and knowledge of a programming language.
Methods of solving equations and systems of equations, error analysis and difference equations

MAT 461. Numerical Analysis II. 3 hrs.
Prerequisite(s): MAT 285 and 460.
Interpolating polynomials, numerical differentiation and integration, numerical solutions of differential equations, and roundoff error

MAT 472. Modern Geometry. 3 hrs.
Prerequisite(s): MAT 280, 326, and 340.
Heuristic and analytic treatment of a branch of modern geometry, such as projective or differential geometry

MAT 475. General Topology. 3 hrs.
Prerequisite(s): MAT 169, 326, and 340.
General topological spaces, bases and subbases, and continuity

MAT 481. History of Mathematics. 3 hrs.
Prerequisite(s): MAT 169, 326, and 340.

Historical development of number and number systems, measurement, algebra, Euclidean and non-Euclidean geometries, calculus, discrete mathematics, statistics and probability including contributions from diverse cultures to each of these mathematical branches. Reasoning and proof, communication, problem solving, connections, representations are integrated throughout the course (Does not count as an upper-level mathematics elective.)

MAT 485. Mathematical Modeling. 3 hrs.

Prerequisite(s): MAT 280, 285, 326, and a programming language.

An introduction to mathematical modeling using case studies; projects and presentations are required

MAT +489. Student Teaching in Mathematics I. 6 hrs.

Prerequisite(s): Approval of the director of student teaching. *Corequisite(s):* MAT 490

MAT +490. Student Teaching in Mathematics II. 6 hrs.

Prerequisite(s): Approval of the director of student teaching. *Corequisite(s):* MAT 489

MAT 492. Special Problems I, II. 1-3 hrs.

Prerequisite(s): Approval of department chair. Students undertaking a Senior Honors Project will enroll in MAT 492H

A.2 Tentative Four Year Schedules

Hattiesburg Campus. The table below provides a tentative four year schedule to assist students in planning their course of study. Note that courses MAT 167, 168, 169, 280, 326, and 340 will be offered every semester, not including summer. As a reference point, the year 2000 is an even year 1.

	Even Yr 1 - Odd Yr 1			Odd Yr 1 - Even Yr 2			Even Yr 2 - Odd Yr 2			Odd Yr 2 - Even Yr 3		
Course	Fall	Spr	Sum	Fall	Spr	Sum	Fall	Spr	Sum	Fall	Spr	Sum
MAT 285	X			X			X			X		
MAT 305	X			X			X			X		
MAT 320	X			X			X			X		
MAT 370	X			X			X			X		
MAT 410						X						X
MAT 415	X			X			X			X		
MAT 417		X			X			X			X	
MAT 418		X						X		X	X	
MAT 419			X						X			
MAT 420		X			X			X			X	
MAT 421			X						X			
MAT 423	X			X			X			X		
MAT 424		X			X			X			X	
MAT 426		X			X			X			X	
MAT 436		X			X			X			X	
MAT 437	X						X					
MAT 439	X						X					
MAT 441	X			X			X			X		
MAT 442		X			X			X			X	
MAT 457	X			X			X			X		
MAT 460	X			X			X			X		
MAT 461		X			X			X			X	
MAT 475									X			
MAT 481		X			X			X			X	
MAT 485			X									

Table 9: (Hattiesburg Campus) Tentative 4-year course schedule

B Forms and Handouts (Departmental)

This section contains the following departmental forms:

1. Request to Waive Course Prerequisite(s)
2. Mathematics Student Survival Sheet
3. Guides for developing a 4-year plan

Request to Waive Course Prerequisite(s)

Course: _____ **Section:** _____

Name: _____ **Student ID Number:** _____

Prerequisite(s): ☐ (1) _____

☐ (2) _____

☐ (3) _____

Indicate by X *all prerequisites which are not met.*

Indicate Reason for Waiver

☐ Prerequisite Course in Progress

☐ Substitution for Prerequisite Course (Indicate Substitution) _____

☐ Advisor Recommendation (Advisor Signature) _____

☐ Other _____

Waiver Statement

The prerequisites indicated for the course above are chosen to best ensure student success, and to guide students in their planning and progress toward a degree. I understand and accept that by taking this course without meeting the prerequisites stated in the course description, I may encounter more difficulty.

Student Signature: _____ **Date:** _____

Faculty Member: _____ **Date:** _____

Department Chair: _____ **Date:** _____

Mathematics Student Survival Checklist

1. *Getting Started...*

   (a) **First Semester of Courses/Email Accounts/Student IDs/etc.**
   Many issues for new students will be taken care of during Preview. Preview is mandatory for all new degree-seeking students at Southern Miss. During Preview, you will obtain your student IDs, as well meet with an advisor from the Department of Mathematics to set up your schedule for your first semester.

   (b) **Getting an advisor.**
   If there is any other set of circumstances in which you need to meet with an advisor, contact the office of the Department of Mathematics (information on back) to be assigned an advisor.

2. *Settling in...*

   (a) **For Licensure Students:** After your first year, you should begin to discuss with your advisor the process of applying for admission to the teacher education program and obtaining a "Gold Card", so that you will be successfully enrolled by the beginning of your junior year.

   (b) **For Non-Licensure Students:** After your first year, you should begin to discuss with your advisor a choice of minor.

   (c) **Start a Research Project:** Working on a research project is a great way to enrich your studies. During your sophomore year, talk with different faculty members to find a research area which interests you. They may have problems available to work on, or, at the least, can point you to an REU (a summer research opportunity) which would fit your interests.

   (d) **Applying for Scholarships:** If you are a student in good standing, and have not already done so, try applying for a scholarship from the Department of Mathematics.

3. *Finishing up ...*

   (a) **Graduation requirements.** Before graduating, you will need to formally apply for graduation in the semester preceding your expected graduation date. The required forms are available at the website for the office of the registrar. Make an appointment to meet with your advisor to complete the application.

(b) **Fill out an exit survey.** Before you leave, be sure to fill out an exit survey. Let us know what experiences were great, or what may need improvement. We definitely want to get your input.

Contacting the Department. If you are on-campus, visit the office of the Department of Mathematics in room 319 of Southern Hall. To contact the department from off campus, use the information below:

The Department of Mathematics
The University of Southern Mississippi
118 College Drive #5045
Hattiesburg, MS 39406-0001
Phone: 601.266.4289
Fax: 601.266.5818
Email: mathdept@usm.edu

In addition, the website for the Department of Mathematics is located at the following web address: http://www.usm.edu/math.

		Year 1			Year 2			Year 3			Year 4		
REQ ##	Course	Fall	Spr	Sum	Fall	Spr	Sum	Fall	Spr	Sum	Fall	Spr	Sum
GEC 01	ENG 101												
GEC 01	ENG 102												
GEC 02	PHY 201/L												
GEC 02													
GEC 02	MAT 167												
GEC 03	ENG 203												
GEC 03													
GEC 03													
GEC 04													
GEC 05													
GEC 05													
GEC 06	CSC 101/L												
GEC 07													
GEC 08													
DEG 01	MAT 168												
DEG 01	MAT 169												
DEG 01	MAT 280												
DEG 01	MAT 320												
DEG 01	MAT 326												
DEG 01	MAT 340												
DEG 01	MAT 423												
DEG 01	MAT 441												
DEG 01	MAT 481												
DEG 01													
DEG 01													
DEG 01													
DEG 01													
DEG 01													
DEG 01													
DEG 02													

Table 10: Guide for developing 4-year Plan (MATBS)

		Year 1			Year 2			Year 3			Year 4		
REQ ##	Course	Fall	Spr	Sum	Fall	Spr	Sum	Fall	Spr	Sum	Fall	Spr	Sum
GEC 01	ENG 101												
GEC 01	ENG 102												
GEC 02	PHY 201/L												
GEC 02													
GEC 02	MAT 167												
GEC 03	ENG 203												
GEC 03	HIS 101												
GEC 03	HIS 102												
GEC 04													
GEC 05	PSY 110												
GEC 05													
GEC 08	CMS 111												
DEG 01	MAT 168												
DEG 01	MAT 169												
DEG 01	MAT 280												
DEG 01	MAT 285												
DEG 01	MAT 305												
DEG 01	MAT 309												
DEG 01	MAT 320												
DEG 01	MAT 326												
DEG 01	MAT 340												
DEG 01	MAT 370												
DEG 01	MAT 420												
DEG 01	MAT 423												
DEG 01	MAT 481												
DEG 01													
DEG 02													
DEG 03	CIS 302												
DEG 03	CIS 313												
DEG 03	MAT 220												
DEG 03	MAT 457/L												
DEG 03	PSY 374												
DEG 03	REF 400												
DEG 03	REF 469												
DEG 03	SPE 400												
DEG 03	MAT 489												
DEG 03	MAT 490												

Table 11: Guide for developing 4-year Plan (MATLBS)