COURSE SYLLABUS

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SECTION 1: COURSE INFORMATION **Format:** 8 weeks

Course ID: MATH 1313

Course Title: Topics in Mathematics

College: College of Natural and Health Sciences

Prerequisites: None

Credit Hours: 3

Instructor: See online course in MyFIRE for instructor contact information and availability

Course Description

This is a discrete mathematics course that demonstrates the beauty and utility of mathematics. Topics for this course are set theory, logic, financial mathematics, probability, elementary graph theory, and voting theory.

Course Workload

Time spent on course assignments will vary by student depending on familiarity with course content, reading rate of speed, writing rate of speed, and other individual factors. Based on averages for most students, it is estimated that the course workload estimate for this course is **09.30** hours a week.

Course Materials

This course is utilizing Follett Access®, a new and convenient program

designed to ensure every student has the course materials they need to succeed. When you register for this course, the required course materials will be ordered for you, and the cost of the materials will be applied to your student account as a course fee. This feature enables you to identify the full cost of your course upfront with no surprises of additional out of pocket expenses for required course materials. Once you are registered in the Student Information System (JICS) and you gain access to the course, you will automatically have access to the required course materials.

If you have questions about the cost of your course materials, please access your financial statement through the Student Information System (JICS). The cost will be listed as a course material(s) fee.

Grades that appear in Pearson are not reflective of course grades; course 3 grades will appear in MyFIRE only.

Required and optional textbooks are accessed and ordered through SEU's bookstore.

Disclaimer: The resources utilized in this course provide information, thoughts and insights that should encourage critical thinking on the part of the student. Please note as well that as an Assembly of God institution,

Southeastern University does not necessarily endorse specific personal, religious, philosophical, or political positions found in these resources.

Intended Learning Outcomes

As a result of reading, study, and assessments in this course, the student should be able to:

1. Use quantitative methods to help analyze problems in academic or social contexts; develop in-depth arguments supported by quantitative

evidence; and communicate those arguments in both verbal form and quantitative displays (e.g., tables, diagrams, graphs, mathematical equations, or other relevant formats).

2. Use set theory and Venn Diagrams to model relationships and solve problems in varying contexts.
3. Use logical connectors and quantifiers to express statements, truth tables, and De Morgan's Law to determine the equivalence of statements, and Euler circles to determine the validity of syllogistic arguments.
4. Use basic financial mathematics to calculate simple and compound interest, monthly payments, and the cost of installment loans using annual percentage rate tables.
5. Apply empirical, theoretical, and conditional probability and solve problems involving tree diagrams, conditional and mutually exclusive events, the counting principle, permutation, and combinations.
6. Use graphs and trees to represent real-life settings and solve problems using Euler and Hamilton paths and circuits.
7. Apply various voting and apportionment methods and use the fairness criteria to determine flaws in voting methods.

Late Work

Work ahead: For planned events (mission trips, vacations, surgeries) you are invited to work ahead in order to submit work by the due date. No permission is needed.

Request an extension: If you know you will not be able to turn work in on time, contact your professor at least 24 hours before the assignment is due.

Let the professor know about your circumstances and when you can turn the work in. If the professor decides to grant you an extension and you get the work in when you say you will, there will not be a penalty. You should only request an extension when something unforeseen comes up that you have no control over; a professor has no obligation to grant an extension and will be less inclined to do so if you are asking for one every week.

Late work: without prior arrangements, late work* submitted within one week of the original due date will be considered for partial credit. Work will ONLY be accepted for the first seven days after it is due. NO WORK will be accepted past the last day of the course. Professors of Foundational Core courses have been instructed to follow this policy to ensure fairness across all FC classes. Your professor will work with you if true emergencies occur, but your busy schedule will not be considered an emergency. If you have travel, a vacation, a wedding, or any other plannable event, it is up to you to communicate with your instructor to avoid grade penalties.

Extra Credit

None accepted.

SECTION 2: SOUTHEASTERN POLICIES Academic Policies

View this link to see Southeastern's Policies regarding SEU's Mission and Vision Statements, Title IX Statement, Student Services, Class Participation, Official Email, MyFIRE Use, Technical Difficulties, Technical Support, Disability Statement, Academic Honesty, Course Evaluation, Official

SECTION 3: COURSE SCHEDULE

The Course Schedule provides a list of your work in this course. The assessments are listed by Module and include the due dates and point values.

Note: Assignments are due by 11:59 p.m. EST on the due date, unless otherwise noted.

AIM, LEARN, AND APPLY DESCRIPTIONS

Aim

 When you see the Aim icon, you will be introduced to topics and ideas that will be covered throughout this module. The AIM will also provide you with a glimpse into your learning objectives and an introduction to this module.

Learn

 When you see the Learn icon, all of your reading assignments will be listed and may include additional resources that your instructor is providing to help you complete the activities and assessments for the module. **Apply**

When you see the Apply Icon, it will be time to demonstrate your learning for the module. The items here are those in which you'll be graded and may include discussions, activities, assignments, quizzes, exams, and projects.

SECTION 3: COURSE SCHEDULE

MODULE 1

 **Aim**

- Complete the pretest

 **Learn**

- **Read:** Students: Getting Started with MyMathLab

 **Apply**

- Pretest
    - Due: Tuesday
    - Points: Ungraded (Must be completed to unlock the remaining course content)

Tips for Success

Set aside plenty of time to study. The standard rule for a traditional math class is that you should spend 2-3 hours outside of class studying for every 1 hour you are in class. Topics in Mathematics is typically a 3-credit hour course. This means in a traditional 16-week semester, students should be spending 3 hours in class plus a minimum of 6-9 hours a week outside of class studying (i.e. 9-12 hours of math total each week). For an online course, your course is accelerated into 8 weeks. This means (depending on your math background of course), you should expect to spend between 18-24 hours a week studying your math material.

Don't wait to start material. Learning a few concepts each day is far more beneficial to you than waiting until right before the exam and attempting to cram in all the information then. Your brain needs time to process complex problem-solving concepts.

PRACTICE. PRACTICE. PRACTICE. The only way to become proficient in math skills is correctly practicing problems over and over again. Keep in

mind that if you are still having to look at examples or refer to notes on your homework, you do NOT know it well enough for the exam. Use the Similar Exercise button until you are able to work the question from start to finish completely on your own. Revisit troubling questions at a later time and see if they make more sense. You wouldn't perform a musical concert (at least not without embarrassing yourself) without rehearsing your song over and over again and spending time working out all the little kinks. View your

math homework as rehearsal for your big performance (i.e. the exam). Yes, math can be as fun as music.

Ask questions! As you are working through homework problems, focus on understanding WHY an answer is correct and not just finding the correct answer. If you don't understand a concept or would just like a more in depth explanation, use the Ask My Instructor button to communicate with your instructor.

Do you need a calculator? Check this out: Desmos Scientific Calculator

MODULE 2



Aim

- Use vocabulary to recognize, describe and create sets, equal sets, and equivalent sets
- Identify and create subsets and proper subsets and determine the

number of subsets and proper subsets of a given set

- Construct Venn diagrams with two and three sets
- Apply set operations such as complement, intersections, union of two sets
- Use Venn diagrams and set concepts to solve application problems



Learn

- **Read:** Chapter 2
  - Section 2.1: Set Concepts
  - Section 2.2: Subsets
  - Section 2.3: Venn Diagrams and Set Operations
  - Section 2.4: Venn Diagrams with Three Sets
  - Section 2.5: Application of Sets
- **Review:** MyMathLab resources (View an Example, Help Me Solve It, Ask My Instructor, etc.)



Apply

- 2.1 Set Concepts
  - Due: Tuesday
  - Points: 30
- Quiz 2.1
  - Due: Tuesday
  - Points: 6

- 2.2 Subsets
  - Due: Tuesday
  - Points: 15
- Quiz 2.2

- Due: Tuesday
- Points: 6

 2.3 Venn Diagrams and Set Operations
- Due: Tuesday
- Points: 22

 Quiz 2.3
- Due: Tuesday
- Points: 6

 2.4 Venn Diagrams with Three Sets
- Due: Tuesday
- Points: 15

 Quiz 2.4
- Due: Tuesday
- Points: 6

 2.5 Applications of Sets
- Due: Tuesday
- Points: 4

 Quiz 2.5
- Due: Tuesday
- Points: 3

 Exam 1 (2.1, 2.2, 2.3, 2.4, 2.5)
- Due: Tuesday
- Points: 23

SECTION 3: COURSE SCHEDULE

MODULE 3

Aim

 Identify statements and compound statements

 Apply quantifiers to determine the negation of a statement Identify statements involving the words not, and, if…then, and if and only if

 Create truth tables for negations, conjunctions, disjunctions, conditional statements, and biconditional statements

 Determine the truth values of statements with and without constructing truth tables

 Use DeMorgan's Laws to determine whether two statements are logically equivalent

 Determine a logical conclusion from a given set of premises Use Euler's diagrams to determine the validity of a syllogistic argument



Learn

 Read: Chapter 3

- Section 3.1 – Statements and Logical Connections
- Section 3.2 – Truth Tables (Negation, Conjunction, Disjunction)
- Section 3.3 – Truth Tables (Conditional, Biconditional)
- Section 3.4 – Equivalent Statements
- Section 3.5 – Symbolic Arguments
- Section 3.6 – Euler Diagrams and Syllogistic Arguments

Review: MyMathLab resources (View and Example, Help Me Solve It, Ask My Instructor, etc.)



Apply

 3.1 Statements & Logical Connectives

- Due: Tuesday
- Points: 20

 3.1 Quiz
- Due: Tuesday
- Points: 6

 3.2 Truth Tables (Negation, Conjunction, Disjunction)
- Due: Tuesday
- Points: 9

 3.2 Quiz
- Due: Tuesday
- Points: 4

 3.3 More Truth Tables (Conditional, Biconditional)
- Due: Tuesday
- Points: 9

 3.3 Quiz
- Due: Tuesday
- Points: 4

 3.4 Equivalent Statements
- Due: Tuesday
- Points: 13

 3.4 Quiz
- Due: Tuesday
- Points: 4

 3.5 Symbolic Arguments
- Due: Tuesday
- Points: 19

 3.5 Quiz

- Due: Tuesday
- Points: 4

 3.6 Euler Diagrams & Syllogistic Arguments

- Due: Tuesday
- Points: 12

 3.6 Quiz

- Due: Tuesday
- Points: 4

 Exam 2 (3.1, 3.2, 3.3, 3.4, 3.5, 3.6)

- Due: Tuesday
- Points: 28

MODULE 4

Aim

- Use empirical and theoretical probabilities to find the likelihood of an event
- Apply the law of large numbers
- Use Tree Diagrams to determine the probability of an event
- Solve probability problems of mutually exclusive and independent events
- Use conditional probability to determine the probability of an event given another event has occurred
- Use the fundamental counting principle to determine the number of distinct ways in which an experiment can be performed
- Use the formula for a permutation to determine the number of order arrangements of a given set of objects
- Use the formula for a combination to determine the number of distinct groups from a given set of objects without regard to their arrangement
- Use combinations to solve probability problems

Learn

- **Read:** Chapter 11
  - Section 11.1 – Empirical and Theoretical Probabilities
  - Section 11.4 – Tree Diagrams
  - Section 11.5 – OR / AND problems
  - Section 11.6 – Conditional Probability
  - Section 11.7 – The Counting Principle and Permutations
  - Section 11.8 – Combinations
  - Section 11.9 – Solve Probability Problems Using Combinations
- **Review:** MyMathLab resources (View an Example, Help Me Solve It, Ask My Instructor, etc.)

Apply

- 11.1 Empirical & Theoretical Probabilities
  - Due: Tuesday
  - Points: 15
- 11.1 Quiz
  - Due: Tuesday
  - Points: 5
- 11.4 Tree Diagrams
  - Due: Tuesday
  - Points: 5
- 11.4 Quiz
  - Due: Tuesday
  - Points: 5
- 11.5 Or/And Problems
  - Due: Tuesday
  - Points: 11
- 11.5 Quiz
  - Due: Tuesday
  - Points: 5
- 11.6 Conditional Probability
  - Due: Tuesday
  - Points: 9
- 11.6 Quiz
  - Due: Tuesday
  - Points: 4
- 11.7 Counting Principle & Permutations
  - Due: Tuesday
  - Points: 15

SECTION 3: COURSE SCHEDULE

- 11.1 Empirical & Theoretical Probabilities
  - Due: Tuesday
  - Points: 15
- 11.7 Quiz
  - Due: Tuesday
  - Points: 6
- 11.8 Combinations
  - Due: Tuesday
  - Points: 9
- 11.8 Quiz
  - Due: Tuesday
  - Points: 3
- Combination or Permutation?
  - Due: Tuesday
  - Points: 11
- 11.9 Quiz
  - Due: Tuesday
  - Points: 3
- Exam 3 (11.1, 11.4, 11.5, 11.6, 11.7, 11.8, 11.9)
  - Due: Tuesday
  - Points: 25

SECTION 3: COURSE SCHEDULE

MODULE 5

Aim

 Convert between a percent, a fraction, and a decimal number Solve problems involving percent change and percent equations Use the simple interest formula to calculate interest charges for loans and the total repayment

 Use the compound interest formula to calculate the accumulated amount of an investment

 Use the present value formula to find the investment needed to reach a future financial goal

 Use the Annual Percentage Rate Table for Monthly Payment Plans to find the monthly payment of a fixed installment loan

 Use the Monthly Principal and Interest Payment per $1000 Table to find the monthly payment for principal and interest of a home mortgage Discuss the interest rates of pawn shops and payday loans in your city and the ethics involved with this business model

Learn

 Read: Chapter 10

- Section 10.1 – Percent
- Section 10.2 – Personal Loans Simple Interest
- Section 10.3 – Compound Interest
- Section 10.4 – Installment Buying including Mortgage Payments

 Review: MyMathLab resources (View an Example, Help Me Solve It, Ask My Instructor, etc.)

Apply

 10.1 Percent
- Due: Tuesday
- Points: 22

 10.1 Quiz
- Due: Tuesday
- Points: 5

 10.2 Personal Loans & Simple Interest
- Due: Tuesday
- Points: 13

 10.2 Quiz
- Due: Tuesday
- Points: 5

 10.3 Compound Interest
- Due: Tuesday
- Points: 14

 10.3 Quiz
- Due: Tuesday

- Points: 5

 10.4 Installment Buying

- Due: Tuesday
- Points: 13

 10.4 Quiz

- Due: Tuesday
- Points: 5

 Exam 4 (10.1, 10.2, 10.3, 10.4)

- Due: Tuesday
- Points: 15

MODULE 6

Aim

 Represent problems using graphs

 Demonstrate an understanding of paths, circuits, and bridges Solve problems involving Euler paths and Euler circuits Demonstrate an understanding of Hamilton paths, Hamilton circuits, and complete graphs

 Use trees to represent real-life problems

 Solve problems involving minimum-cost spanning trees Discuss how using a weighted graph, brute force method, nearest neighbor method, and optimal solution can help you when planning a trip

Learn

 Read: Chapter 13

- Section 13.1 – Graphs, Paths, and Circuits
- Section 13.2 – Euler Paths and Euler Circuits
- Section 13.3 – Hamilton Paths and Hamilton Circuits

- Section 13.4 – Tree Graphs

Review: MyMathLab resources (View an Example, Help Me Solve It, Ask My Instructor, etc.)

Apply

13.1 Graphs, Path, and Circuits

- Due: Tuesday
- Points: 18

13.1 Graphs, Path, and Circuits

- Due: Tuesday
- Points: 18

13.1 Graphs, Path, and Circuits

- Due: Tuesday
- Points: 18

13.1 Quiz

- Due: Tuesday
- Points: 5

13.2 Euler Paths and Euler Circuits

- Due: Tuesday
- Points: 17

13.2 Quiz

- Due: Tuesday
- Points: 5

13.3 Hamilton Paths and Hamilton Graphs

- Due: Tuesday
- Points: 15

13.3 Quiz

- Due: Tuesday

- Points: 5

- 13.4 Tree Graphs
  - Due: Tuesday
  - Points: 17
- 13.4 Quiz
  - Due: Tuesday
  - Points: 5
- Exam 5 (13.1, 13.2, 13.3, 13.4)
  - Due: Tuesday
  - Points: 20

SECTION 3: COURSE SCHEDULE

MODULE 7

Aim

- Use the plurality method, the Borda count method, the plurality with elimination method, or the pairwise comparison method to determine the winner of an election
- Solve apportionment problems using Hamilton's and Jefferson's methods
- Understand that all voting methods and apportionment methods are flawed in some way by being familiar with the vocabulary of the flaws (the majority criterion, head-to-head criterion, monotonicity criterion, the irrelevant alternatives criterion, the Alabama paradox, population paradox, and the newstates paradox)

Learn

- **Read:** Chapter 14

- Section 14.1 – Voting Methods
- Section 14.3 – Apportionment Methods
- Section 14.2/14.4 – Vocabulary of Voting Methods Flaws and Apportionment Methods Flaws

 Review: MyMathLab resources (View an Example, Help Me Solve It, Ask My Instructor, etc.)

Apply

 14.1 Voting Methods
- Due: Tuesday
- Points: 22

 14.1 Quiz
- Due: Tuesday
- Points: 8

 14.2 Flaws of the Voting Method
- Due: Tuesday
- Points: 15

 14.3 Appointment Methods
- Due: Tuesday
- Points: 16

 14.3 Quiz
- Due: Tuesday
- Points: 5

 14.4 Flaws of the Apportionment Methods
- Due: Tuesday
- Points: 4

 Exam 6 (14.1, 14.2, 14.3, 14.4)
- Due: Tuesday

- Points: 15

MODULE 8

Aim

- Complete comprehensive final exam

Learn

- **Review:** Final Exam Review (optional)
- **Review:** MyMathLab resources (View an Example, Help Me Solve It, Ask My Instructor, etc.)

Apply

- Final Exam Review
  - Due: Tuesday
  - Points: Optional and ungraded

- Final Exam (Post Test)
  - Due: Tuesday
  - Points: 27

SECTION 4: ASSESSMENTS

MyMathLab Homework Assignments

Description

The best way to study math is to practice problems a little bit each day. Before you attempt the exam, you should be able to do all of the homework problems without having to refer to notes or help resources. If you are still having to get help on homework problems, you have not practiced enough for the exam. Practice is the key to success. Ask your instructor for help by clicking the "ask the instructor" icon included in each homework question if there is a problem you are continually getting wrong. Your instructor is here

to help you.

Total Possible Points

436

Grade Weight

15%

Quizzes

Description

Quizzes give you a chance to practice the material is smaller chunks. What is unique about the quizzes, is that you have unlimited attempts for each assessment. If you do not receive full credit the first time you take the quiz, feel free to take it again. MyMathLab will take your highest score for each section's quiz. With enough effort and completion, a student should have a 100% average in the quiz category.

Total Possible Points

137

Grade Weight

10%

Tests

Description

Exams may only be taken one time. Make sure you have completed all homework assignments and have thoroughly practiced every problem on the

homework before attempting the exams. The exams must be completed in a single session. You have 60 minutes to complete the exams.

Total Possible Points

153

Grade Weight

75%

Pretest

Description

Complete the pretest to the best of your ability. You are not expected to know the material on this exam. The grade will not count towards your grade for the course.

Total Possible Points

Ungraded

Grade Weight

0%