MATH-M118 Syllabus

Course Information
Course Title: Finite Mathematics
Course Number: MATH-M118
Credit Hours: 3.0
IUK Section Number: #28485
Room: KO-080
Days and Time: TR 4:00 PM-5:15 PM
Semester: Spring 2019
Prerequisites: Placement recommendation based on ALEKS test score OR a grade of C – or better in MATH-M105 OR equivalent.
Course Description: Selected topics including: set theory, linear systems, matrices, probability, and linear programming, applications to problems from business and the social sciences.

Instructor Information
Contact: Christopher Caruvana chcaru@iuk.edu 765-455-9338
Office Hours: MW 11:00am – 12:00pm, TR 3:00pm – 4:00pm
Office: KO-081 D
Appointments: Please send a Canvas message to schedule an appointment. Online office hours are available through Zoom.

Course Materials
2. TI-83 or TI-84 graphing calculator. See calculator policy for details.
3. 3-ring binder (or similar) to organize homework, assignments, quizzes, tests, and notes for this course. Bring your binder to every class meeting.

Grading
Graded Course Components
<table>
<thead>
<tr>
<th>Component</th>
<th>Percentage of Final Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>Participation</td>
<td>2%</td>
</tr>
<tr>
<td>Canvas Quizzes</td>
<td>3%</td>
</tr>
<tr>
<td>In-Class Quizzes</td>
<td>5%</td>
</tr>
<tr>
<td>Assignments &amp; Projects</td>
<td>25% of final grade</td>
</tr>
<tr>
<td>In-Class Tests (3)</td>
<td>45% of final grade</td>
</tr>
<tr>
<td>Final Exam</td>
<td>20% of final grade</td>
</tr>
</tbody>
</table>

Weighted Average

<table>
<thead>
<tr>
<th>Percentage Range</th>
<th>Letter Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>90%-100%</td>
<td>A (A+ if over 98.4%; A- if below 91.5%)</td>
</tr>
<tr>
<td>80%-89%</td>
<td>B (B+ if over 88.4%; B- if below 81.5%)</td>
</tr>
<tr>
<td>70%-79%</td>
<td>C (C+ if over 78.4%; C- if below 71.5%)</td>
</tr>
<tr>
<td>60%-69%</td>
<td>D (D+ if over 68.4%; D- if below 61.5%)</td>
</tr>
<tr>
<td>below 60%</td>
<td>F Nonattendance indicators: FN/FNN</td>
</tr>
</tbody>
</table>

Important Dates
Tests and Final Exam
In-class tests and the final will be in pencil and paper format. The final exam is comprehensive. Dates are subject to change with two weeks’ notice. Textbooks, notes, cell phones, and other electronics are prohibited during tests.

<table>
<thead>
<tr>
<th>Test</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test #1</td>
<td>Thursday, 31 January</td>
</tr>
<tr>
<td>Test #2</td>
<td>Thursday, 7 March</td>
</tr>
<tr>
<td>Test #3</td>
<td>Tuesday, 11 April</td>
</tr>
<tr>
<td>Final</td>
<td>Tuesday, 30 April @ 4:00 PM – 6:00 PM</td>
</tr>
</tbody>
</table>
Holidays – No Class
21 Jan. Martin Luther King, Jr. Day
10 Mar. – 17 Mar. Spring Break

Withdrawal Deadlines
8 March for Purdue Technology students
14 April for Indiana University students
Withdrawal forms will not be approved after the deadline above. It is the responsibility of the student to complete the withdrawal process by the deadline. Contact academic advising and financial aid for details.

To Succeed in this Course
You should expect to spend 6 hours/week outside of class for:
• studying the textbook examples and preparing for quizzes or tests
• completing homework and assignments

On-Campus Tutoring Resources
• Free Tutoring at the Math Commons: http://www.iuk.edu/sciences/math-commons/index.php
  9:00 AM – 8:00 PM on Monday – Thursday, 9:00 AM – 2:00 PM on Friday
• Location: Math Lab (KO-054) and Math Commons (KO-050)
  Please remember to sign in. The Commons and Lab are open when classes are in session.
• One-on-one and online tutoring appointments are available. Visit the Commons to make an appointment.

IU Kokomo Student Policies
• Accessibility http://iuk.edu/academic-affairs/resources/Accessibility-Statement.php
• Sexual Misconduct http://iuk.edu/academic-affairs/resources/Sexual-Misconduct-Statement.php
• Civility Statement http://iuk.edu/academic-affairs/resources/civility%20statement.php
• Student Handbook http://www.iuk.edu/advising/handbook/
• Code of Student Rights, Responsibilities, and Conduct http://studentcode.iu.edu/
• Emergency Procedures http://protect.iu.edu/emergency/procedures

Policies
Test Make-Up Policy for Mathematics Courses
• If you know that you cannot attend class when a test is scheduled, you should contact your instructor in writing (by email) at least two weeks in advance to make alternative arrangements for taking the test.
• If you miss a test with no advance notice for a valid reason (e.g. due to illness), you must contact your instructor within 24 hours of the test. At the instructor’s discretion, a make-up test may be offered. All make-up tests must be completed before the graded tests are returned to the rest of the class.
• If you miss a second test, you will be required to provide a documented reason for your absence in order to make-up the missed test. Without such documentation, your score for the missed test will be 0.
• If it is not possible to schedule a make-up test and you provide documentation, your grade for one missed test will be determined by your final exam grade.

Calculator Policy
• The TI-83 or TI-84 calculator will be used in this course.
• Please note that you will not be permitted to use the TI-89, TI-Nspire, or any CAS calculator.

Late Work Policy
• Late work is not accepted. See Low Scores Policy. If there is an extenuating circumstance with documentation (jury duty, surgery, hospitalization, etc.), that may be taken into consideration.
• If you know in advance that you will miss class due to a valid reason such as an IUK athletic event, KEY fieldtrip, or religious observance, all makeup work should be completed prior to the missed class date. It is the student’s responsibility to make arrangements well in advance to complete the work early.
Low Scores Policy

- To accommodate for situations preventing attendance, the lowest two quiz scores will be dropped.
- Your final exam grade may replace one test grade. This replacement will only occur if your final exam score is higher than your lowest test score.

Academic and Personal Conduct Policy

- Kindly refrain from using smartphones, laptops, and tablets during class. If you depend on technology for note-taking, please discuss that need with me.
- Please step into the hallway to take an urgent call or text message. If you anticipate this could occur, please sit near a door to minimize classroom disruption. Disruptive classroom behavior is not permitted.
- All quizzes, graded assignments, and in-class tests are to be your work alone.
- Use of computer algebra systems to generate or check answers on tests, quizzes, or homework is not permitted and is considered cheating. This includes using unapproved calculators and math help websites.

Required eTextbook Homework

Chapter 5: Sets and Counting

- Section 5.1, p194: #(1 – 13) odd, (15-21) all, (33 – 45) odd, 51, 53, (55 – 62) all
- Section 5.2, p200: #1, 3, 5, (9 – 21) odd, (27 – 41) odd, 45, 47, 49
- Section 5.3, p204: #(1 – 10) all, (11 – 25) odd, (31 – 45) odd, (51 – 69) odd
- Section 5.4, p210: #(1 – 47) odd, 51, 53, 55, 59, 61
- Section 5.5, p217: #1 – 21 odd, (22 – 27) all, (29 – 37) odd, 47, 48, 51, 57, 59
- Section 5.6, p224: #1, 3, 5, 7, (21 – 25) odd

Chapter 6: Probability

- Section 6.1, p248: #(1 – 9) odd, 10a [ans: ii, iii, vi], (11 – 23) odd, 27
- Section 6.3, p265: #(1 – 19) odd, (25 – 31) odd, 35, 37, 41
- Section 6.4, p274: #(1 – 19) odd, 21, 23, 27, 29, (33 – 39) odd, 49, 51, 53, 57
- Section 6.5, p283: #3, 5, 7, 9, 13, 15, 17, 19, 25, 29, 31, 39, 40, 49
- Section 6.6, p290: #3, 5, 7, 9, 11, 12ab [ans: a. 98/143; b. 0.0025], 15, 17, 21

Chapter 7: Probability and Statistics

- Section 7.3, p323: #(1 – 19) odd, 23, 25, 27, (41 – 47) odd
- Section 7.4, p333: #1, 2 [ans: –0.15], 6 [ans: Both $2100]

Chapter 2: Matrices

- Section 2.1, p58: #(1 – 7) odd, 11, 13, 15, (23 – 31) odd, 39, 45, 49, 51
- Section 2.2, p66: #17, 19, 21, 25, 27, 33, 35, (45, 47) set up only
- Section 2.3, p78: #(1 – 55) odd
- Section 2.4, p90: #(1 – 5) odd, 11, 13, 19, 21
- Section 2.5, p95: #1, 3, 5, 9, 13, 15, 17

Chapter 8: Markov Chains

- Section 8.1, p377: #(1 - 15) odd, 19, 21, 23, 25, 29, 33
- Section 8.2, p388: #9, 11, 13, 15, 17, 19, 21, 23

Chapter 3: Linear Programming

- Section 3.1, p113: #7, 9, 11, 12, 13
- Section 3.2, p121: #(1 – 11) odd, (15 – 21) odd, (25 – 41) odd. For (33 – 41) odd, set up LLP only.
### Course Schedule: Due Dates

<table>
<thead>
<tr>
<th>Date</th>
<th>Section</th>
<th>Topics/Assignments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tues. 1/8</td>
<td>5.1</td>
<td>Sets</td>
</tr>
<tr>
<td>Thurs. 1/10</td>
<td>5.2</td>
<td>Fundamental Principle of Counting</td>
</tr>
<tr>
<td>Tues. 1/15</td>
<td>5.3</td>
<td>Venn Diagrams and Counting</td>
</tr>
<tr>
<td>Thurs. 1/17</td>
<td>5.4</td>
<td>Multiplication Principle</td>
</tr>
<tr>
<td>Tues. 1/22</td>
<td>5.5</td>
<td>Permutations and Combinations</td>
</tr>
<tr>
<td>Thurs. 1/24</td>
<td>5.6</td>
<td>Further Counting Techniques</td>
</tr>
<tr>
<td>Tues. 1/29</td>
<td>Review</td>
<td>HW &amp; CQ 5.6, Project &amp; Feedback Ch. 5</td>
</tr>
<tr>
<td>Thurs. 1/31</td>
<td>Test 1 (5.1-5.6)</td>
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<tr>
<td>Tues. 2/5</td>
<td>6.1</td>
<td>Experiments, Outcomes, Sample Spaces, &amp; Events</td>
</tr>
<tr>
<td>Thurs. 2/7</td>
<td>6.2</td>
<td>Assignment of Probabilities</td>
</tr>
<tr>
<td>Tues. 2/12</td>
<td>6.3</td>
<td>Calculating Probabilities of Events</td>
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<tr>
<td>Thurs. 2/14</td>
<td>6.4</td>
<td>Conditional Probability and Independence</td>
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<tr>
<td>Tues. 2/19</td>
<td>6.4, Continued</td>
<td>Quiz 4</td>
</tr>
<tr>
<td>Thurs. 2/21</td>
<td>6.5 Tree Diagrams; 6.6 Bayes’ Theorem</td>
<td>HW &amp; CQ 6.4, Assignment 4</td>
</tr>
<tr>
<td>Tues. 2/26</td>
<td>6.5 &amp; 6.6, Continued</td>
<td>HW &amp; CQ 6.5-6.6, Project &amp; Feedback Ch. 6</td>
</tr>
<tr>
<td>Thurs. 2/28</td>
<td>7.3 Binomial Trials; 7.4 Expected Value</td>
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<tr>
<td>Tues. 3/5</td>
<td>Review</td>
<td>HW &amp; CQ 7.3-7.4, Project &amp; Feedback Ch. 7</td>
</tr>
<tr>
<td>Thurs. 3/7</td>
<td>Test 2 (6.1-6.6, 7.3-7.4)</td>
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<tr>
<td>Tues. 3/12</td>
<td>[No Class: Spring Break]</td>
<td></td>
</tr>
<tr>
<td>Thurs. 3/14</td>
<td>[No Class: Spring Break]</td>
<td></td>
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<tr>
<td>Tues. 3/19</td>
<td>2.1 Systems of Linear Equations</td>
<td>HW &amp; CQ 2.1, Assignment 5</td>
</tr>
<tr>
<td>Thurs. 3/21</td>
<td>2.2 General Systems of Equations</td>
<td>HW &amp; CQ 2.2, Quiz 5</td>
</tr>
<tr>
<td>Tues. 3/26</td>
<td>2.3 Arithmetic Operations on Matrices Review</td>
<td>HW &amp; CQ 2.3, Assignment 6</td>
</tr>
<tr>
<td>Thurs. 3/28</td>
<td>2.4 Inverse of a Matrix; 2.5 Gauss-Jordan Method</td>
<td>HW &amp; CQ 2.4-2.5, Project &amp; Feedback Ch. 2</td>
</tr>
<tr>
<td>Tues. 4/2</td>
<td>8.1 Transition Matrix</td>
<td>HW &amp; CQ 8.1, Quiz 6</td>
</tr>
<tr>
<td>Thurs. 4/4</td>
<td>8.2 Regular Stochastic Matrices</td>
<td>HW &amp; CQ 8.2, Project &amp; Feedback Ch. 8</td>
</tr>
<tr>
<td>Tues. 4/9</td>
<td>Review</td>
<td></td>
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<tr>
<td>Thurs. 4/11</td>
<td>Test 3 (2.1-2.4, 8.1-8.2)</td>
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<tr>
<td>Tues. 4/16</td>
<td>3.1 Linear Programming Problem</td>
<td>Assignment 7</td>
</tr>
<tr>
<td>Thurs. 4/18</td>
<td>3.2 Fundamental Theorem of Linear Programming</td>
<td>HW &amp; CQ 3.1, Quiz 7</td>
</tr>
<tr>
<td>Tues. 4/23</td>
<td>Review</td>
<td>HW &amp; CQ 3.2, Project &amp; Feedback Ch. 3</td>
</tr>
<tr>
<td>Thurs. 4/25</td>
<td>Review</td>
<td></td>
</tr>
<tr>
<td>Tues. 4/30</td>
<td>Final Exam (All)</td>
<td></td>
</tr>
</tbody>
</table>

- HW = eText Homework; CQ = Canvas Quiz; Projects & Feedback are on Canvas
- Assignments are due at the beginning of class. If you are unable to attend class, you may email your completed assignment (scanned or photographed) to me before the beginning of class.
- You are expected to complete required textbook homework after lecture on each section. Homework should be completed prior to the next class meeting.
- **Bring your binder and graphing calculator to every class meeting.** Quizzes will be in-class. You may be permitted to use your homework binder (closed book) on some select quizzes. You will benefit from keeping homework organized and up-to-date!
- This schedule is tentative and subject to change.
Course Learning Objectives

1. Linear Inequalities
   a. Students will be able to graph systems of linear inequalities and determine the vertices of the graph of the solution set algebraically.

2. Matrices (Ch. 2 sections 1-5)
   a. Students will be able to use the Gaussian Elimination Method for solving systems of linear equations for systems with one unique, infinitely many, or no solutions.
   b. Students will be able to perform arithmetic operations on matrices including addition/subtraction, scalar multiplication, and matrix multiplication.
   c. Students will be able to determine and use inverse matrices.
      i. Students will be able to describe the definition of identity matrices and an inverse matrix.
      ii. Students will be able to determine the inverse of a matrix using elementary row operations.
      iii. Students will be able to use $A^{-1}$ to solve a system of linear equations.

3. Linear Programming (Ch. 3 sections 1-2)
   a. Students will be able to translate an application problem into a mathematical linear programming problem, including both maximize and minimize problems.
   b. Students will be able to solve a two-variable linear programming problem graphically.

4. Sets and Counting (Ch. 5 section 1-6)
   a. Students will recognize and use basic set operations including the union, intersection, complement.
      i. Students will be able to determine the elements of a set from verbal descriptions and set builder notation.
   b. Venn Diagrams
      i. Students will be able to graphically represent named sets on Venn diagram
      ii. Students will be able to count the number of elements in various sets using Venn diagrams
   c. Students will be able to apply the Multiplication Principle of Counting appropriately.
   d. Students will be able to apply Permutations and Combinations appropriately.
   e. Students will be able to use combined methods of counting including “at least one”, “at most 1” problems.

5. Probability (Ch. 6, sections 1-7; Ch. 7 sections 3-4)
   a. Students will recognize and use the terminology of probability including experiment, sample space, and event.
   b. Students will be able to produce probability distribution tables of an experiment and understand their fundamental properties.
   c. Students will be able to use the complement of an event to determine probabilities.
   d. Students will be able to compute probabilities using the Inclusion-Exclusion principle and Venn diagrams.
   e. Students will be able to calculate probabilities when all outcomes are equally likely.
   f. Students will be able to compute conditional probabilities.
   g. Students will be able to identify and use the properties of independent events.
   h. Students will be able to use tree diagrams to compute probabilities.
      i. Students will be able to use Bayes’ Theorem appropriately.
      j. Students will be able to identify and compute binomial probability distributions.
      k. Students will be able to compute the expected value of a probability distribution.

6. Markov Chains
   a. Students will be able to identify Markov processes and determine their transition matrices.
   b. Students will be able to use the transition matrix to determine future distributions as well as determine the stable distribution of a regular stochastic process algebraically.
   c. Students will be able to determine when a stochastic process contains an absorbing state and determine its long term trends.

Campus Learning Outcomes

This course fulfills the Quantitative Math Skills goal and its components, for degrees in the Arts and Sciences:
- Translate a problem from words into mathematical symbols
- Solve the problem
- Draw valid conclusions from the result.

This course fulfills Outcomes 1, 2, and 3 of the Campus General Education Quantitative Literacy requirement:

Outcome 1: Students will translate a verbal problem into mathematical symbols
   Component 1: Students will represent mathematical information symbolically
   Component 2: Students will represent mathematical information graphically

Outcome 2: Students will solve the mathematical problem that models the verbal problem
   Component 1: Students will use algebraic methods to solve problems, using technology when appropriate
   Component 2: Students will use graphical methods to solve problems, using technology when appropriate

Outcome 3: Students will use the solution of the mathematical problem to draw valid conclusions about the verbal problem
   Component 1: Students will draw inferences from mathematical models
   Component 2: Students will interpret empirical results