Fall 9-1-2006

MAT 117.01: Probability and Linear Algebra

Charles Funkhouser
The University Of Montana

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MAT 117: PROBABILITY AND LINEAR ALGEBRA

(c) Fall 2006

DR. CHARLES FUNKHOUSE

CLASS TIMES: Monday, Wednesday & Friday, 8:10 AM - 9:30 AM or Tuesday & Thursday, 5:10PM - 6:30PM

LOCATION: HB - 11 or HB – 06


OFFICE: AD – 09C

OFFICE HOURS: Wednesday, 3:30PM – 4:30PM Thursday, 11:30AM – 12:30PM

PHONE: 406-243-7853

E-MAIL: Charles.Funkhouser@mso.umt.edu

COURSE OVERVIEW

Instruction in mathematics is fundamental to the development of an educated and contributing member of society. This course will suggest ways in which current practice, research, and technology can be used to better master fundamental concepts of finite mathematics applicable to a variety of degree programs and career choices. MAT 117 will help you become better prepared for subsequent mathematics courses and your chosen career.

TOPICS (Not necessarily in the given order)

1. Problem solving
2. Critical thinking
3. Linear functions
4. Systems of linear equations and matrices
5. Linear programming by graphing
6. Fundamental concepts of probability
7. Counting and probability
8. Foundations of statistics
9. Markov chains
OBJECTIVES

Students who successfully complete MAT 117 will be able to:

1. use a variety of tools, physical models, and appropriate technology to develop an understanding of fundamental concepts of linear algebra and probability, and their relationship to the real world.

2. formulate and solve problems whose solutions require skill in finite mathematics.

3. apply linear algebra, probability and statistics to everyday and work situations.

4. explore the operations, properties, and uses of finite mathematics.

5. develop and solve problems using systems of linear equations by a variety of methods.

6. explore the foundations of counting and probability, including conditional and non-conditional probability.

7. use permutations and combinations to enhance facility in counting and probability.

8. compute, apply and interpret measures of central tendency.

9. compute, apply and interpret measure of variation.

10. describe, apply and compute using properties of Markov Chains.

11. use paper-and-pencil representations, manipulative materials, and technological devices to conduct explorations in linear algebra and probability.

12. become familiar with current finite mathematics as it relates to one’s chosen career.
COURSE REQUIREMENTS

<table>
<thead>
<tr>
<th>Points Possible</th>
<th>Points Obtained</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Mathematics Problem Writeup</td>
<td>10</td>
</tr>
<tr>
<td>2. Problem Presentation</td>
<td>15</td>
</tr>
<tr>
<td>3. Notetaking</td>
<td>5</td>
</tr>
<tr>
<td>4. In-class Assignments</td>
<td>10</td>
</tr>
<tr>
<td>5. Student's Choice</td>
<td>10</td>
</tr>
<tr>
<td>6. Announced Quizzes</td>
<td>80</td>
</tr>
<tr>
<td>7. Unannounced Quizzes</td>
<td>20</td>
</tr>
<tr>
<td>8. Midterm Examination</td>
<td>50</td>
</tr>
<tr>
<td>9. Comprehensive Examination</td>
<td>100</td>
</tr>
<tr>
<td>10. Attendance/Participation</td>
<td></td>
</tr>
</tbody>
</table>

[Since group activities cannot be "made up", -1 point for each class missed - FOR ANY REASON (see #4)]

These are the only criteria used to evaluate your work. *There is no "extra credit" available.*

GRADING SCALE

<table>
<thead>
<tr>
<th>Grade</th>
<th>Percent</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>90-100%</td>
<td>270-300</td>
</tr>
<tr>
<td>B</td>
<td>80-89</td>
<td>240-269</td>
</tr>
<tr>
<td>C</td>
<td>70-79</td>
<td>210-239</td>
</tr>
<tr>
<td>D</td>
<td>60-69</td>
<td>180-209</td>
</tr>
<tr>
<td>F</td>
<td>&lt; 60</td>
<td>&lt; 180</td>
</tr>
</tbody>
</table>

*(For example, 269 points is a B, 270 points is an A.)*

LATE POLICY

Each assignment is to be submitted on the due date. This includes quizzes and tests. The grade for a late quiz or test is 0%. The grade for other late materials will be reduced by 10% for each week or partial week they are late.

This policy is applied to ALL assignments which are late FOR ANY REASON.

NO ASSIGNMENTS will be accepted after the last regular class meeting.
ELECTRONIC DEVICES
In order to encourage an atmosphere of free and honest intellectual exchange in our class, electronic recording, receiving or transmitting devices of any type may not be used. Similarly, please turn off all cell phones and other electronic devices before entering our classroom.

ACTIVITIES

1. Problem Writeup: Choose one “word problem” given in the problem sets which have been assigned to more fully develop a solution. The “Applications” section of our exercises is an especially useful source for this activity. The following format is required for your writeup:

   Bibliographical Data: book title, author, page, problem number (1)

   Problem Statement: Copy the problem as is in the text, then restate it in your own words. (2)

   Summary of your solution to the problem (2)

   Visual, graphic, technology-based or concrete model of the problem (2)

   Personal Statement regarding the potential usefulness of the problem to YOU in your degree program or chosen career (3)
   (Objectives 1, 2, 3, 14, 15)

2. Problem Presentation: Each student shall prepare a solution to an application or ”word problem” from the problem sets in our textbook for presentation in our class. The presentation should be motivational and instructional. Presentations should last about 3-5 minutes. Handouts or other materials to share are required.
   (All objectives)

3. Notetaking: Each student shall be responsible for reporting about one class meeting. Typed copies of the report shall be made available to all class members within one week. Reports should include:

   - Date of the class meeting
   - Sections of textbook covered
   - Topics considered
     - Activities and significant ideas emphasized
   (Varies)

4. In-class Assignments: Brief assignments related to readings or class sessions will be given at some class meetings. These will include, but not be limited to, small group or mathematics lab activities. Such assignments are especially integral to a complete understanding of the content of the course. Attendance is critical in completion of this course component.
   (All objectives)
5. Student's Choice: Some activity in class might have been especially helpful for you to grow in mathematics and toward your career. Choose one activity and REPEAT it, ENHANCE it, or CREATE your original version. You may also choose to negotiate (with your instructor) another activity which you think will be especially helpful in growing as a learner of mathematics. Such activities may include, but are not limited to, conferences, workshops, or the development of career-related materials.

(Varies)

6. Announced Quizzes: These quizzes will cover material discussed since the previous quiz or test. Such quizzes will usually be given at the end of the week. There will be five opportunities in class to determine your four "Announced Quiz" scores.

(Varies)

7. Unannounced Quizzes: These quizzes will cover material assigned in a recent class session. There will be two such quizzes. All "Unannounced Quizzes" will be "take home." They will be given out at the end of a class period and due by the beginning of the next class meeting. Note that consistent with the course “Late Policy”, neither can be "made up.”

(Varies)

8. Midterm Examination: The midterm examination will cover material presented in the preceding class meetings. Sources for this examination will include the text, discussions, activities, and lectures.

(All objectives)

9. Comprehensive Examination: An examination will cover all material presented throughout the course. Sources for this examination will include the text, discussions, activities, and lectures.

(All objectives)

10. Attendance/Participation: Your active participation is encouraged and expected. Active participation is not possible without your consistent attendance. In-class assignments missed FOR ANY REASON cannot be made up. (See COURSE REQUIREMENTS #4 for additional information on how these points are obtained.)

(All objectives)
<table>
<thead>
<tr>
<th>Module</th>
<th>Activity</th>
<th>Readings</th>
<th>Due</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Overview</td>
<td>Syllabus &amp; TOC</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>C. 1, Linear Functions</td>
<td>pp.1-48</td>
<td>A6</td>
</tr>
<tr>
<td>3</td>
<td>C. 2, Systems of Linear Equations &amp; Matrices</td>
<td>pp. 49-126</td>
<td>A6</td>
</tr>
<tr>
<td>4</td>
<td>C. 3, Linear Programming: Graphical Methods</td>
<td>pp. 127-151</td>
<td>A1</td>
</tr>
<tr>
<td>5</td>
<td>Midterm Examination</td>
<td></td>
<td>A8</td>
</tr>
<tr>
<td>6</td>
<td>C. 7, Sets &amp; Probability</td>
<td>pp. 313-392</td>
<td>A6</td>
</tr>
<tr>
<td>7</td>
<td>C. 8, Counting &amp; Probability</td>
<td>pp. 393-453</td>
<td>A6</td>
</tr>
<tr>
<td>8</td>
<td>C. 9, Statistics</td>
<td>pp. 454-506</td>
<td>A5, A6</td>
</tr>
<tr>
<td>9</td>
<td>C. 10, Markov Chains</td>
<td>pp. 507-543</td>
<td>A2, A3</td>
</tr>
<tr>
<td>10</td>
<td>Comprehensive Examination</td>
<td></td>
<td>A9 (See bulletin)</td>
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</tbody>
</table>