Course Outcomes Guide (COG)

Course Title: MAT 207 – Discrete Mathematics **Date:** May 2013

Course Team: Jennifer Szczesniak

Expected Learning Outcomes

GENERAL EDUCATION

Upon successful completion of this course, a student should be able to:

1. Apply mathematical methods involving arithmetic, algebra, geometry, and graphs to solve problems.
2. Represent mathematical information and communicate mathematical reasoning symbolically and verbally.
3. Interpret and analyze numerical data, mathematical concepts, and identify patterns to formulate and validate reasoning.

COURSE LEARNING OUTCOMES:

Upon successful completion of this course, students will:

1. Write a correct proof, including proof by induction.
2. Solve counting problems and basic probability problems using combinatorial techniques.
3. Verbally explain the relationship between a statement and its converse, inverse, and contra-positive, including how to correctly negate statements.
4. Perform set operations, including intersection, union, and finding the complement.
5. Demonstrate an understanding of the fundamental concepts of graph theory including but not limited to graphs, digraphs, trees, finding paths and cycles, weighted graphs and graph coloring.

Assessment

- In the past, we have included several common questions to all sections of the course. Starting in Fall 2013 we will be implementing a similar model, but adjusting the questions.

Validation

- For our older data, we used a homemade assessment tool, so we have no way to validate the data.
- With the assessment starting in Fall 2013, we will be adjusting the questions that we use. All of our new questions will come from sources with national data available such as

retired Praxis, GRE subject, and SAT subject tests. This will allow us to benchmark our students' results against a national average.

Results

- We currently have results for our old data set. It demonstrates that students are not comfortable with proofs, which is not unexpected. This should be their first real introduction to the process of proving or disproving a statement and students at this level should have difficulty with the subject. The course will be offered as a regular course in FA13. During the class, students will have ample time to work together in groups and with the instructor to improve their proof techniques.

Follow-up

- As a follow-up I decided to offer the course as a lecture section during the Fall 2013 semester. This course has only been offered as a summer online course since I started teaching it. This made the interaction needed to embrace the subject much harder. By holding it as a traditional course, we will have more opportunity for the group work and discussion needed to fully understand the material.

Budget Justification

- Aside from supporting continued professional development opportunities, I foresee no budget requests for this course.

SLOA Data

	SU09	SU10	SU11	SU12
# Active students	6	7	13	13
%W	0	0	7.7	7.7
*% walk-away Fs No final exam/grade = F	NA	NA	NA	7.7
General Education SLOA**	NA	NA	NA	NA
% Success (A,B,C)	100	71.4	76.9	76.9
Common Assessment Average Score (out of 31)	NA	18	21.9	21.6
Mean course grade	3.67	2.00	3.08	3.17
Item Analysis **Weakest Content Areas**	Proofs	Proofs	Proofs	Proofs

*% Walk-away Fs = Did not take the final exam and received a grade of F.
** This class has not been offered since the General Education SLOA has been implemented.

Current Assessment Tool

4. Use the sets $A = \{n, a, m, e\}$ and $B = \{a, m, u, s, e\}$ and $U = \{s, u, p, e, r, m, a, n\}$ to find the following: (3 points each - ***CHOOSE 6***)

a) $A \cap B$ b) $A \cup B$ c) $\overline{B}$

d) $\overline{A \cap B}$ e) $\overline{A} \cap B$ f) $A \cap (A \cup \overline{B})$

g) $\overline{A \cup \overline{B}}$ h) $A - B$ i) $(B - A) \cap (A - B)$

5. Give an example of sets for which $(A - B) - C \neq A - (B - C)$. (6 points)

12. You're playing the daily Pick 4 lotto and, because you rigged the game, you know that the only numbers that will be drawn will be ones, fives and eights. Find the number of possible outcomes if each of the four digits chosen is taken from its own bin with balls labeled 0 to 9. (4 points)

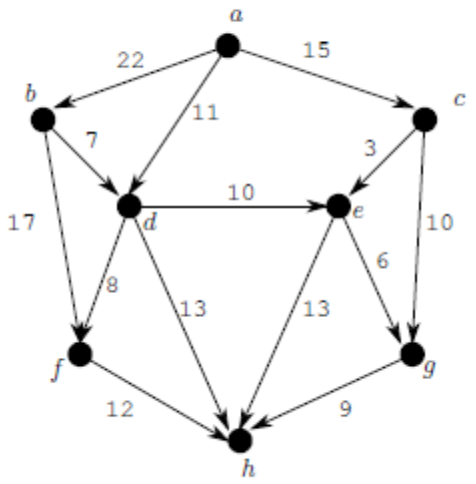
13. Suppose you're playing a game that requires you to roll a die twice. What is the probability that you roll at least one 4 or that the dice add to 5? (6 points)

17. Prove that for every integer n, $n^4 - n^2$ is divisible by 4. (10 points)

2. Find the GCD of 543 and 906 using the Euclidean algorithm. (4 points)

Current Assessment Tool, continued

6. Use the graph below for the following, if possible. If it is not possible, write "not possible" under the problem. (3 points each)



a) The path of least weight from a to h. List the path and its weight below.

b) A minimum spanning tree. You may draw this on the graph and write the weight below.

c) A maximum flow. Write the values on the graph next to the capacities and write the total flow below.