West Linn–Wilsonville School District

Mathematics – Course Statement

<div style="text-align:center">

Course Title: Discrete Mathematics

</div>

Length of Course: Year
Number of Credits: 1
Grade Level: 10, 11, 12
Prerequisites: Advanced Algebra

Date of Description/Revision: 2013

Course Overview	

This course is an advanced mathematics course designed to explore a variety of topics. Topics include, but are not limited to: optimization, probability, combinations, graph theory and discrete mathematics.

Essential Questions	Concepts providing focus for student learning

- How can you model the physical, political, social etc. world with discrete mathematics?
- How can you use the computer to model the world with a computer?
- What is graph theory and how do we use it to model the world?
- How is probability used to model events in the world?

Common Core Standards For Mathematical Practice	

Students will develop the following practices throughout the course:
- Make sense of problems and persevere in solving them.
- Reason abstractly and quantitatively.
- Construct viable arguments and critique the reasoning of others.
- Model with mathematics.
- Use appropriate tools strategically.
- Attend to precision
- Look for make use of structure.
- Look for and express regularity in repeated reasoning.

Proficiency Statements	

Upon completion of course, students will be able to:
- Represent problem situations using discrete structures such as finite graphs, matrices, sequences, and recurrence relations.
- Represent and analyze finite graphs using matrices.
- Develop and analyze algorithms.
- Solve enumeration and finite probability problems.
- Represent and solve problems using linear programming and difference equations.
- Investigate problem situations that arise in connection with computer validation and the application of algorithms.
- Use the computer to model various ideas such as traffic flow.
- Compete in the COMAP modeling contest.

West Linn–Wilsonville School District

Mathematics – Course Statement

General Course Topics/Units & Timeframes	
A. Election theory - Group-ranking methods and algorithms - More group-ranking methods and paradoxes - Arrow's Conditions and approval voting - Weighted voting and voting power - Proportional representation B. Fair division - Estate division - Apportionment algorithms - Fair division algorithms: the continuous case - Mathematical induction - Envy-free division C. Matrix operations and applications - Addition and Subtraction of Matrices - Multiplication of Matrices - Population Growth: The Leslie Model 1 D. Probability - Multiplication Rule - Permutations and combinations with compound events - Calculate expected values - Evaluate outcomes of decisions E. Graphs and their applications - Critical paths - Vocabulary and representations of graphs - Euler circuits and paths - Hamiltonian circuits and paths - Graph coloring - Eulerizing graphs - Planarity and coloring - The Traveling Salesperson Problem - Shortest route problems - Trees and their properties - Minimum spanning trees - Binary trees, expression trees, and traversals - Steiner Trees - Counting and probability - Monte Carlo methods	
Resources	
• Text: *Thinking Mathematically, Fifth Edition*, Blitzer, Pearson Prentice Hall, 2010	