

MISSOURI WESTERN STATE UNIVERSITY
COLLEGE OF LIBERAL ARTS AND SCIENCES
DEPARTMENT OF COMPUTER SCIENCE, MATHEMATICS, AND PHYSICS

CLASS SYLLABUS

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| I. | <u>Course Number</u> CSC289 | <u>Course Name</u> Computational Methods for CS | <u>Credit</u> 3 |
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II. Prerequisites: A grade of C or better in MAT167, CSC208 and CSC254.

III. Course Description: This course provides the underlying mathematical foundations and applied algorithms that are used across the basic fields in Computer Science. The course will focus on the computational algorithms in the fields of semantic search, data encryption and computer security, computer graphics, gaming and simulation. Further the course will consider the impact/computational limitations of current hardware on the application of these algorithms.

IV. Text: No required textbook but the following books are good references.

1. *Compiler Construction: Principles and Practice* by Kenneth C. Louden, PWS Publishing Company, 1997, ISBN #0-534-93972-4
2. *Computer Graphics for Java Programmers*, 2nd Edition, by Leen Ammeraal and Kang Zhang, John Wiley & Sons, 2007, ISBN: 9780470031605.
3. *Simulation Modeling and Analysis*, 4th Edition, by Averill Law, McGraw Hill, 2006, ISBN-10: 0071255192
4. *Discrete Mathematics DeMystified*, 1st Edition, by Steven Krantz, McGraw-Hill, 2008

V. Course Objectives:

The goal of this course is to provide students with basic mathematical skills for their future study on the following topics:

- a. Compiler Construction
- b. Computer Graphics
- c. Simulation and Modeling
- d. Cryptography

VI. Course Outline:

- I. Regular Expression and Automata for Compiler Construction
 1. Scanning and Tokens
 2. Regular Expression
 3. Finite Automata
 - a. DFA – Deterministic Finite Automation
 - b. NFA – Non-Deterministic Finite Automation
 - c. Implementing Finite Automata

- II. Computational Geometry for Computer Graphics
 - 1. Coordinate system for graphics
 - 2. Vectors and Matrix Operation
 - 3. Geometric Transformations
- III. Probability for Simulation and Modeling
 - 1. Probability Basics
 - 2. Probability Models
 - 3. Discrete Event Simulation
 - 4. Single Server Queuing System
- IV. Number Theory for Cryptography
 - 1. Cryptography and Modular Arithmetic
 - 2. Affine Transformation Encryption
 - 3. Digraph Transformation Encryption
 - 4. RSA Encryption