

**Mississippi Valley State University**  
**Mathematics, Computer & Information Science**  
**Itta Bena, Mississippi 38941**  
**Course Syllabus**  
**FALL 2018**

**Course Number:** CS341

**Total Credits:** 3

**Office:** BB404

**Website:** <http://bluebird.mvsu.edu/~qianghe/>

**Course Title:** Discrete Structures

**Course Instructor:** Dr. Qiang He

**Email:** qianghe@mvsu.edu

**Course Description:** This course provides an introduction to the fundamental ideas of discrete mathematics, basic computer-related concepts, and lays the foundation for the development of more advanced mathematical and computational concepts.

**Course Prerequisite:** CS204 Data Structures

**Text Book:**

Discrete Mathematics

Gary Chartrand & Ping Zhang

Edition: 1

Publisher: Waveland Pr Inc

ISBN-13: 978-1577667308

ISBN-10: 1577667301

**Program Objectives and Outcomes:**

1. Graduates will be successful in computer science related fields.  
*By the time of graduation, students will have:*
  - 1.1 An ability to use current techniques, skills, and tools necessary for computing practice.
  - 1.2 An ability to apply mathematical foundations, algorithmic principles, and computer science theory in the modeling and design of computer-based systems in a way that demonstrates comprehension of the tradeoffs involved in design choices.
  - 1.3 An ability to apply design and development principles in the construction of software systems of varying complexity.
2. Graduates will apply knowledge in computer science and related fields to solve problems.  
*By the time of graduation, students will have:*
  - 2.1 An ability to apply knowledge of computing and mathematics appropriate to the program's student outcomes and to the discipline.
  - 2.2 An ability to analyze a problem, and identify and define the computing requirements appropriate to its solution.
  - 2.3 An ability to design, implement, and evaluate a computer-based system, process, component, or program to meet desired needs.

**Course Outcomes:***Students will be able to:*

1. To develop students' mathematical reasoning, including formal logic and proofs.
2. To provide students with the basic tools to compare relative efficiency of algorithms.
3. To develop students' ability to manipulate abstract structures such as sets, graphs and trees, relations and functions, and finite automata.
4. To demonstrate their understanding of concepts via programming assignments.

<b>Course Outcomes Mapped to Program Outcomes</b>											
<b>CS341 Discrete Structures</b>											
Course Outcomes	PO 1.1	PO 1.2	PO 1.3	PO 2.1	PO 2.2	PO 2.3	PO 3.1	PO 3.2	PO 3.3	PO 3.4	PO 3.5
1	X	X	X	X	X	X					
2	X	X	X	X	X	X					
3	X	X	X	X	X	X					
4	X	X	X	X	X	X					

**Course outline:**

- Basic logic: Propositional logic; logical connectives; truth tables; normal forms (conjunctive and disjunctive); validity; predicate logic; limitations of predicate logic; universal and existential quantification; modus ponens and modus tollens
- Fundamental structures: Functions (surjections, injections, inverses, composition); relations (reflexivity, symmetry, transitivity, equivalence relations); sets (Venn diagrams, complements, Cartesian products, power sets); pigeonhole principle; cardinality and countability
- Proof techniques: Notions of implication, converse, inverse, contrapositive, negation, and contradiction; the structure of formal proofs; direct proofs; proof by counterexample; proof by contraposition; proof by contradiction; mathematical induction; strong induction; recursive mathematical definitions; well orderings
- Basics of counting: Counting arguments; pigeonhole principle; permutations and combinations; recurrence relations
- Graphs and trees: Fundamental definitions; simple algorithms; traversal strategies; proof techniques; spanning trees; applications
- Matrices: Basic properties; applications

**Units covered:**

Basic logic	10 core hours
Functions, relations, and sets	6 core hours
Proof techniques	9 core hours (of 12)
Basics of counting	5 core hours
Graphs and trees	6 core hours
Matrices	3 core hours (of 6)

Elective topics

1 hour

### Estimated CSAB Category Content

	Core	Advanced
Data Structures	0	1.5
Computer Organization & Architecture Algorithms	0	0.5
Software Design	0	1
Concepts of Programming Languages	0	0

### Grading Policy:

Overall grades will roughly follow a 90/80/70/60 scale, but professor reserves the right to adjust the curve upward or downward as appropriate. Your grades will be determined as follows:

- Homework and/or Quizzes: 10%
- Projects: 40%
- Midterm: 20%
- Final: 20%
- Class participation/performance: 10%

### Oral and Written Communications

None

### Social and Ethical Issues

None

### Theoretical Content

Introduction to Algorithms and Time complexity

### Problem Analysis and Design

Students have to analyze, design and implements solutions to problems

### Student with Special Needs:

Mississippi Valley State University is committed to providing reasonable accommodations for students with a documented disability. If you feel you are eligible to receive accommodations for a covered disability (medical, physical, psychiatric, learning, vision, hearing, etc.) and would like to request it for this course, you must be registered with the Services for Students with Disabilities (SSD) program administered by University College. It is recommended that you visit the Disabilities Office located inside the EMAP Computer Lab in the Technical Education (IT) Building to register for the program at the beginning of each semester.

For more information or to schedule an appointment, please contact Mr. Billy Benson, Jr. via phone or email at 662-254-3005 or [billy.benson@mvsu.edu](mailto:billy.benson@mvsu.edu).

I reserve the right to make changes on this syllabus as needed. This document does not constitute a contract with the University. It contains guidelines.