1. *Course number and name*: CSCI 5330 Algorithm Design and Analysis

2. *Credits and contact hours*: 3 credit, 3 contact

3. *Instructor's or course coordinator's name*: Muralidar Medidi, PhD

4. *Text book, title, author and year*: Introduction to Algorithms, 3rd Ed., T. Cormen, C. Leiserson, R. Rivest, and C. Stein
   a. *Other supplemental materials:* None

5. *Specific course information*
   a. *Brief description of the content of the course (Catalog Description)* An in-depth study of the design, implementation, testing, and analysis of algorithms. Graduate students will be given an extra assignment determined by the instructor that undergraduates will not be required to do.
   b. *Prerequisites*: A minimum grade of "C" in CSCI 3236 and MATH 2242
   c. *Indicate whether a required, elective, or selected elective course in the program*
      Required course for BS-CS.

6. *Specific goals for the course*
   a. *Specific outcomes of instruction, ex. The student will be able to explain the significance of current research about a particular topic.*

Course Learning Outcomes	Student Outcomes
Understand and apply the concepts of O, Ω, Θ and o notations	1a, 1i, 2a
Ability to perform theoretical and empirical analysis of iterative and recursive algorithms	1a, 1i, 2a
Understand and apply Monte Carlo and Las Vegas randomized algorithms	1a, 1b, 1i, 2a
Understand divide and conquer and a variety of problems that are solved using divide and conquer	1a, 1b, 1i, 2a
Understand the greedy method and a variety of problems that are solved using the greedy method	1a, 1b, 1i, 2a
Understand dynamic programming and a variety of problems that are solved using dynamic programming	1a, 1b, 1i, 2a

Understand breadth-first and depth-first search and traversal technique for graphs	1a, 1i, 2a
Understand the concept of backtracking and a variety of problems that are solved using backtracking	1a, 1b, 1i, 2a
Understand the basic concepts of NP-Hard and NP-Complete problems	1a, 1i, 2a

b. Student Outcomes:

- 1a: An ability to apply knowledge of computing and mathematics appropriate to the discipline
- 1b: An ability to analyze a problem, and identify and define the computing requirements appropriate to its solution
- 1i: An ability to use current techniques, skills, and tools necessary for computing practice
- 2a: 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

7. *Brief list of topics to be covered*

- Mathematical elements for algorithm analysis
- Algorithms that are based on certain generic methods such as greedy and divide-and-conquer techniques
- Dynamic programming
- Graph-related algorithms such BFS/DFS, MST and concepts and polynomial transformations of NP- related problems