CSC 549: Advanced Algorithm Design and Analysis

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2. credit units 4  contact hours 4

3. Course Coordinator: Theresa Migler-VonDollen

4. Textbook (or other required material): “Algorithm Design” - Kleinberg and Tardos

5. a. Course Description: Advanced study of algorithmic topics such as dynamic programming, network flows, and linear programming. Additional topics include complexity classes and reductions. Particular attention paid to NP Complete problems, with the introduction of approximation algorithms.

   b. Prerequisite: CSC 349

   c. Required/Elective/Selective Elective for CPE, CSC, EE, SE

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6. a. Course Learning Objectives

   The student will be able to:
   • Summarize and critique advanced algorithmic techniques.
   • Design and analyze algorithms for NP Complete problems.
   • Reframe complex real-world problems and formulate algorithmic solutions to those problems.
   • Compare various approximation algorithms that exist for a given problem.
   • Judge which algorithms are particularly valuable in certain contexts.
   • Effectively and accurately distill current algorithmic research and results.
   • Collaborate with fellow students to develop solutions to advanced algorithmic problems.

   b. Level at which Student Outcomes are addressed
   (“B” = Basic level, “I” = Intermediate level, “A” = Advanced level)
7. **Major Topics Covered: (number of lecture hours per)**

- Dynamic Programming - 2 weeks
- Network Flows - 1 week
- NP and Computational Intractability - 2 weeks
- Approximation Algorithms - 2 weeks
- Linear and Integer Programming - 2 weeks
- Research Presentations - 1 week