COURSE DESCRIPTION

<table>
<thead>
<tr>
<th>Course No.</th>
<th>Course Type</th>
<th>Course Title</th>
<th>Coordinator</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSC 555</td>
<td>Sel. Elect.</td>
<td>Algorithm Analysis and Design</td>
<td>Lixin Fu</td>
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**Sem. Hours**: 3

**Current Catalog Description:**
Sequential algorithm design and complexity analysis. Dynamic programming, Greedy algorithms. Graph algorithms. Selected advanced topics from NP-completeness; approximation, randomized, parallel, number-theoretic algorithms; Fast Fourier Transform; computational geometry; string matching.

**Textbook:**


**References:**
None

**Course Outcomes:**

Upon successful completion of this course, a student should be able to
1. **understand** how recursion works (CO1)
2. know how to **design** dividing and conquer algorithms using three steps and apply to merge sort, quick sort, Strassen’s matrix multiplication (CO2)
3. **understand** big-O notations, and analyze common algorithms using them (CO3)
4. **use** greedy strategy to solve some graph problems such as MST, Shortest path (CO4)
5. **apply** dynamic programming to matrix train, LCS, and graph algorithms (CO5)
6. **understand** NP-completeness and why it is important (CO6)
7. **prove** some problems e.g. CLIQUE, VC, subset sum etc are NP-complete (CO7)
Prerequisites by Topic:

Students must have
- a grade of at least C (2.0) in CSC 330 (Advanced Data Structures)

Major Topics Covered in the Course:

- Preliminaries (asymptotic notations, data structures)
- Randomized algorithms
- Divide and conquer
- Greedy algorithms
- Dynamic programming
- Graph algorithms
- NP-completeness and approximation algorithms

Estimated Curriculum Category Content (Semester hours):

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<thead>
<tr>
<th>Area</th>
<th>Core</th>
<th>Advanced</th>
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<th>Advanced</th>
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<td>Software design</td>
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<td>Data structures</td>
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<td>Prog. Languages</td>
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