New Course Proposal

Program Areas: Math and Computer Science

1. **Catalog Description of the Course.**

**COMP 510 ALGORITHMS (3)**
Three hours lecture per week
Prerequisite: Admission to the Computer Science or Mathematics Graduate Program
Design strategies for algorithms and data structures. Theoretical limits to space and time requirements.
Time/space trade-offs. Categories of problems and algorithms. Applications to business, bioinformatics, engineering, telecommunications and other disciplines. Open problems in the field.

2. **Mode of Instruction.**

<table>
<thead>
<tr>
<th>Units</th>
<th>Hours per Unit</th>
<th>Benchmark Enrollment</th>
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</thead>
<tbody>
<tr>
<td>Lecture</td>
<td>3</td>
<td>24</td>
</tr>
<tr>
<td>Seminar</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Laboratory</td>
<td>0</td>
<td>0</td>
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<tr>
<td>Activity</td>
<td>0</td>
<td>0</td>
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3. **Justification and Learning Objectives.**

Justification: This course is a core course for graduate students in MS in Mathematics and MS in Computer Science programs. A course in algorithms is a required component of most graduate programs in Computer Science. Newer domains such as Bioinformatics require new algorithms.

Learning Objectives:

1. Be able to describe the philosophy guiding various design techniques (e.g. greedy, divide-and-conquer, dynamic programming)
2. Be able to select the appropriate algorithm design technique to apply to a given application problem
3. Apply properly the use of recursive backtracking and branch-and-bound algorithms to search problems
4. Be able to recognize a basic set of NP-complete problems
5. Be able to apply algorithmic methods in other fields.

4. **Is this a General Education Course?**

No.

5. **Course Content in Outline Form.**

Topics:
1. Amortized Analysis
2. Network Flows
3. Linear Programming
4. NP - Completeness
5. Approximation Algorithms
6. Genetic Algorithms and Bioinformatics
7. Applications

6. **References.**

<table>
<thead>
<tr>
<th>Title</th>
<th>Author</th>
<th>Publisher</th>
<th>Year</th>
<th>ISBN</th>
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7. **Faculty Qualified to Teach This Course.**

Qualified Faculty: Computer Science Faculty

8. **Frequency.**
Projected semesters to be offered: Fall, Spring, Summer

9. **New Resources Required.**
   a. New Equipment needs:
      Use of existing computer lab
   b. New Library needs: none
   c. New Space/Facilities needs: none

10. **Consultation.**
    Attach consultation sheet from all program areas, Library, and others (if necessary).

11. **Program Modification.**
    If this new course will alter any degree, credential, certificate, or minor in your program, attach a program modification.

12. **Proposer of Course.**

    Proposer: P. Smith, AJ.Bieszczad  Date: 10/28/2003

    Proposer of Course                      Date