Advanced Data Structures 高級數據結構

This course introduces advanced techniques for designing data structures with strong theoretical guarantees. Topics to be covered include (i) generic methods such as partial persistence, logarithmic rebuilding, weight balancing, filtering, independent sampling, bit twiddling, tabulating, etc., and (ii) specific structures such as the interval tree, the priority search tree, cuckoo hashing, the van Emde Boas structure, range min structures, locality sensitive hashing, the suffix tree, the count-min sketch, etc.

Grade Descriptor:

A

EXCELLENT – exceptionally good performance and far exceeding expectation in all or most of the course learning outcomes; demonstration of superior understanding of the subject matter, the ability to analyze problems and apply extensive knowledge, and skillful use of concepts and materials to derive proper solutions.

B

GOOD – good performance in all course learning outcomes and exceeding expectation in some of them; demonstration of good understanding of the subject matter and the ability to use proper concepts and materials to solve most of the problems encountered.

C

FAIR – adequate performance and meeting expectation in all course learning outcomes; demonstration of adequate understanding of the subject matter and the ability to solve simple problems.
### Equivalent Offering:

<table>
<thead>
<tr>
<th>Units:</th>
<th>3 (Min) / 3 (Max) / 3 (Acad Progress)</th>
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<tbody>
<tr>
<td>Grading Basis:</td>
<td>Graded</td>
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<tr>
<td>Repeat for Credit:</td>
<td>N</td>
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<tr>
<td>Multiple Enroll:</td>
<td>N</td>
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<tr>
<td>Course Attributes:</td>
<td>MSc Computer Science, MPhil-PhD Computer Sci &amp; Erg</td>
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### Topics:

#### COURSE OUTCOMES

<table>
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<th>Learning Outcomes:</th>
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<td>At the end of the course of studies, students will have acquired the ability to</td>
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<td>1. Understand the theory behind the techniques covered;</td>
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<td>2. Utilize those techniques to design new data structures for solving other related problems.</td>
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Course Syllabus:
This course introduces advanced techniques for designing data structures with strong theoretical guarantees. Topics to be covered include (i) generic methods such as partial persistence, logarithmic rebuilding, weight balancing, filtering, independent sampling, bit twiddling, tabulating, etc., and (ii) specific structures such as the interval tree, the priority search tree, cuckoo hashing, the van Emde Boas structure, range min structures, locality sensitive hashing, the suffix tree, the count-min sketch, etc.

Assessment Type:
- Essay test or exam: 75%
- Homework or assignment: 25%

Feedback for Evaluation:
1. Quiz and examinations
2. Course evaluation and questionnaire
3. Question-and-answer sessions during class
4. Student consultation during office hours or online

Required Readings:
To be provided by course teacher.

Recommended Readings:
1. CSCI5610 Acad Organization=CSEGv; Acad Career=RPG

**COMPONENTS**
LEC : Size=30; Final Exam=Y; Contact=3

**ENROLMENT REQUIREMENTS**

1. CSCI5610

Enrollment Requirement Group:
For students in MSc Computer Science or Mphil - PhD Computer Science & Engineering or UG Computer Science or UG Computer Engineering;
Pre-requisite: CSCI2100 or ESTR2102

CAF

<END OF REPORT>