

Academic Org: Div of Computer Science & Engg – Subject: Computer Science

**Course:** CSCI5630      **Course ID:** 013793      **Eff Date:** 2022-07-01      **Crse Status:** Active      **Apprv. Status:** Approved      **【Course Rev】**  
Advanced Topics in Graph Mining 進階圖數據挖掘

This course introduces advanced techniques for graph mining. Topics to be covered include, but are not limited to graph classification, graph clustering, community detection, influence maximization, dense subgraph finding, frequent subgraph mining, correlated subgraph mining, subgraph matching, subgraph motif enumeration, graph centralities, and other important and emerging topics in graph mining. The course will cover both classic and the state-of-the-art algorithms and systems for the topics to be studied.

本課程介紹圖數據挖掘的前沿專題。涵蓋的主題包括但不限於圖分類、圖聚類、社區檢測、影響最大化、稠密子圖查找、頻繁子圖挖掘、相關子圖挖掘、子圖匹配、子圖枚舉、圖中心度等圖數據挖掘中的重要和新興主題。本課程將涵蓋圖數據挖掘中經典和最先進的算法和系統。

**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.

有關等級說明的資料，請參閱英文版本。

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.

有關等級說明的資料，請參閱英文版本。

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.

有關等級說明的資料，請參閱英文版本。

D

MARGINAL – performance barely meets the expectation in the essential course learning outcomes; demonstration of partial understanding of the subject matter and the ability to solve simple problems.

有關等級說明的資料，請參閱英文版本。

F

FAILURE – performance does not meet the expectation in the essential course learning outcomes; demonstration of serious deficiencies and the need to retake the course.

有關等級說明的資料，請參閱英文版本。

**Equivalent Offering:**

**Units:** 3 (Min) / 3 (Max) / 3 (Acad Progress)

**Grading Basis:** Graded

**Repeat for Credit:** N

**Multiple Enroll:** N

**Course Attributes:** MSc Computer Science  
MPhil-PhD Computer Sci & Erg

**Topics:**

**COURSE OUTCOMES**

**Learning Outcomes:**

At the end of the course of studies, students will have acquired the ability to

1. master the basic skills and techniques of a broad range of important topics in graph mining;
2. understand the key ideas in the design and implementation of some representative algorithms of each topic introduced in the course;
3. understand the key ideas in the design and implementation of the state-of-the-art systems of each topic introduced in the course;
4. relate the algorithms and systems learnt in the course to real-world applications.

**Course Syllabus:**

This course introduces advanced techniques for graph mining. In the course of studies, students will learn

1. the state-of-the-art algorithms for graph classification, graph clustering, and community detection, and their implementations in modern dataflow systems;
2. the state-of-the-art algorithms for influence maximization and their implementations in modern dataflow systems;
3. the classic and latest algorithms for dense subgraph finding, frequent subgraph mining, correlated subgraph mining, and their distributed implementations;
4. the classic and latest algorithms for subgraph matching and subgraph motif enumeration, and their distributed implementations;
5. the classic and latest algorithms for graph centralities, and their scalable implementations;
6. other important and emerging topics in graph mining.

**Assessment Type:**

Presentation	: 30%
Project	: 50%
Report	: 20%

**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 instructor.

**Recommended Readings:**

1. Graph Mining: Laws, Tools, and Case Studies (Synthesis Lectures on Data Mining and Knowledge Discovery) 1st Edition by Deepayan Chakrabarti and Christos Faloutsos, Morgan & Claypool Publishers; 1st Edition (October 19, 2012)
2. Introduction to Data Mining (2nd Edition) (What's New in Computer Science) 2nd Edition by Pang-Ning Tan, Michael Steinbach, Anuj Karpatne, and Vipin Kumar, Pearson; 2nd Edition (January 4, 2018)

**OFFERINGS**

1. CSCI5630 Acad Organization=CSEGV; Acad Career=RPG

**COMPONENTS**

LEC : Size=30; Final Exam=N; Contact=3

**ENROLMENT REQUIREMENTS**

1. CSCI5630

**Enrollment Requirement Group:**

For students in MSc Computer Science; or  
For students in MPhil-PhD Computer Science & Engineering; or  
For undergraduate students in Computer Science (CSCIU & CSCIN) or Computer Engineering (CENGU & CENGN)

**CAF**

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