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THE CHINESE UNIVERSITY OF HONG KONG
Print Course Catalog Details

July 25, 2024
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Academic Org: Div of Computer Science & Engg – Subject: Computer Science

Course: CSCI5650   **Course ID:** 013796   **Eff Date:** 2024-07-01   **Crse Status: Active**   **Apprv. Status:** Approved   **[New Course]**

Graph Neural Networks 圖神經網絡

Graph is a fundamental data structure with a wide range of applications. This course covers advanced topics in graph neural networks (GNN) that include, but are not limited to: introductory algorithms and analyses for graph mining, graph-based semi-supervised learning, graph embedding techniques, graph convolution networks, graph attention networks, graph encoder-decoder, graph transformer, knowledge graphs and translation models, application of graph algorithms, etc.

Advisory: Students are expected to have the background of deep learning, machine learning, linear algebra, programming, and data structure.

圖是具有廣泛應用程序的基本數據結構。 本科涵蓋圖神經網絡（GNN）的高級主題，包括但不限於：圖挖掘的入門算法和分析，基於圖的半監督學習，圖嵌入技術，圖卷積網絡，圖注意力網絡，圖 編碼器-解碼器，圖形轉換器，知識圖和轉換模型，圖算法的應用等。

建議: 學生應曾修讀深度學習，機器學習，線性代數，編程和數據結構的相關課程。

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

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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

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。

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. Understand and be knowledgeable about the basic models and algorithms for graph mining and graph neural

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networks

2. Implement and evaluate some of the graph neural network models and algorithms presented in the course

3. Use the learned knowledge and applied them in a project that solves a real-world problem

4. Communicate concisely and clearly about how to use graph neural networks in solving a real-world problem

Course Syllabus:

At the end of the course of studies, students will have acquired:

1. Knowledge in basic concept of graph mining and graph neural networks

2. Knowledge in models and algorithms for graph mining and analysis

3. Knowledge in graph embedding models and algorithms

4. Knowledge in graph neural network models and algorithms

5. Knowledge in operations for knowledge graphs

6. Knowledge in some graph-based applications

Assessment Type:

Examination	: 30%
Homework or assignment	: 20%
Presentation	: 20%
Project	: 30%

Feedback for Evaluation:

1. Quiz and examinations
2. Midterm course evaluation and questionnaire
3. Course evaluation and questionnaire
4. Question-and-answer sessions during class
5. 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, Deepayan Chakrabarti and Christos Faloutsos, Morgan & Claypool Publishers; 1st Edition (October 19, 2012)
2. Mining Graph Data, Diane J. Cook and Lawrence B. Holder, John Wiley & Sons, 2006
3. Introduction to Graph Neural Networks, Zhiyuan Liu and Jie Zhou, Morgan & Claypool (March 20, 2020)

OFFERINGS

1. CSCI5650　　　　　　　　　　Acad Organization=CSEGV; Acad Career=RPG

COMPONENTS

LEC : Size=30; Final Exam=N; Contact=3
TUT : Size=30; Final Exam=N; Contact=1

ENROLMENT REQUIREMENTS

1. CSCI5650　　　　　　　　　　**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)

Additional Information

VTL-Onsite face-to-face hrs　　　0
VTL-Online synch. hrs　　　0
VTL-Online asynch. hrs　　　0

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