

EIE3112

Database System

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Main Topics

1. Database design and development
2. Database management and security
3. Data warehousing (mining) and data analysis (big data analytics)

Textbooks:

1. T. Connolly and C. Begg, *Database Systems: A Practical Approach to Design, Implementation, and Management*, 6th Edition, Pearson, 2015. (5th Edition is also fine)

References:

1. M. L. Gillenson, *Fundamentals of database management systems*, Wiley, 2012, 2nd
2. *The database hacker's handbook defending database servers*, Wiley, 2005.
3. S. Owen et al. *Mahout in Action*, Manning, 2012.

Syllabus

1. Database Design and Development
 - 1.1 DBMS systems; Client-server architecture; Database architectures and the web
 - 1.2 SQL: data manipulation; data definition;
 - 1.3 DB Development: DB applications and views;
 - 1.4 Advanced SQL: SQL programming language; stored procedures; functions; triggers; cursors; exception handling
 - 1.5 ER Modelling: ER diagrams; Transforming ER diagrams to relations
 - 1.6 Normalization: Data redundancy and update anomalies; functional dependencies; normalization processes; normal forms
2. Managing Database Environments
 - 2.1 Database Security: Database security best practices; SQL injection; Preventing SQL injection
 - 2.2 Database Admin
3. Data Warehouse and Data Mining
 - 3.1 Architectures of data warehouse; applications of data warehouse; data warehouse tools and technologies
 - 3.2 Data warehouse queries; OLTP versus OLAP;
 - 3.3. Data-mining processes; Data representation;
 - 3.4. Classification, regression, and cluster Analysis

Tentative Teaching Schedule for Wednesday class (2019/20)

Topic	Date	Topics (Lecture sequence may change to reflect teaching progress and needs.)	Lecturer	Submission due
1	12/2	Online Lec: Introduction to Databases Tut: MySQL Workbench	Pauli	
2	19/2	Online Lec: Relational Models and ER diagrams Presentation Tips by ELC Tut: ER diagrams	Pauli	
3	26/2	Flipped: Structural Query Language (SQL) (Part 1) SQL Challenge Game demonstration Tut: SQL (Part 1)	Pauli	<i>Knowledge-check Quiz (1%)</i>
4	4/3	Flipped: SQL (Part 2) Tut: SQL (Part 2)	Pauli	<i>Knowledge-check Quiz (1%)</i>
5	11/3	Online Lec: SQL (Part 3) Tut: SQL (Part 3)	Pauli	<i>Video Assg 1st submission</i>
16/3 onwards		Recess period		

Remaining topics (schedule to be announced after the end of recess period is confirmed)

Lab1: SQL

Lab2: Advanced SQL

Lec: Database Normalization

Lec: Data Warehousing

Lec: Data Mining

Lab3: Data Mining

Lec: Big Data Analytics

Lec: Database Security

Coursework & Exam

- 5 Knowledge-check Quizzes (1% x 5)
 - Purpose: check your knowledge learnt immediately after lecture or flipped classroom
- Mid-term Written Test (15%)
- Video Assignment (5%)
- SQL Challenge Game Assignment (5%)
 - Level 0 to Level 5
 - Get 5% if you finally achieved Level 5
 - Deadline: **End of semester 2**
- 3 Labs, 2 Reports (10% x 2)
 - Lab1: SQL
 - Lab2: Advanced SQL
 - Lab3: Data Mining and Big Data Analytics
 - Choose any two labs to submit lab reports.
 - If you submit all three lab reports, the highest two scores would be counted.
 - Deadline for each Lab report: ONE week after the corresponding Lab
- Exam (50%)

Teaching & Learning project –

Engaging students through technology-enhanced interactive activities outside classroom

- You are invited to participate in a study conducted by Dr. Pauli Lai.
- The aim of this study is to improve students' learning experience through technology-enhanced interactive activities outside classroom with
 - 1) flipped classroom
 - students have the flexibility to watch video lectures anytime and anywhere instead of attending face-to-face classes in physical classroom.
 - 2) use of web-based gaming platform (SQL Challenge Game)
 - SQL Challenge Game is a fun and challenging web-based game platform designed to arouse students' interests and motivate them to practice more with the questions related to the subject – SQL (Structured Query Language).
 - 3) video assignment
 - Students are asked to conduct a research for a selected topic and record a short video of their presentations.

Blackboard Collaborate

- Blackboard Collaborate was designed for delivering online synchronous session using web conferencing technology so that students can attend lecture in remote places.
- Online Lecture: online synchronous session
- Face-to-face lecture: the teaching material can be synchronized to students' screen for being seen clearly.
- Also, features provided by BlackBoard Collaborate such as polling, virtual whiteboard, and breakout room could be used for interactive activities, discussion and collaborative work.
- Help for Blackboard Collaborate Ultra Experience
 - <https://en-us.help.blackboard.com/Collaborate/Ultra>
- Blackboard Collaborate Ultra (1'22")
 - https://www.youtube.com/watch?v=YFxDm_fVgrw
- User Interface Tour in Blackboard Collaborate with the Ultra Experience (3'00")
 - <https://youtu.be/KNCI7e0cAF8>

Blended Learning

- **Blended learning** is an education program (formal or informal) that combines online digital media with traditional classroom methods
- Teaching&Learning Activities include a mixture of both face-to-face and online activities delivered in-class and out-of-class.

In-class face-to-face activities:

- Mini-lectures
- Tutorial exercises
- Small Group discussion

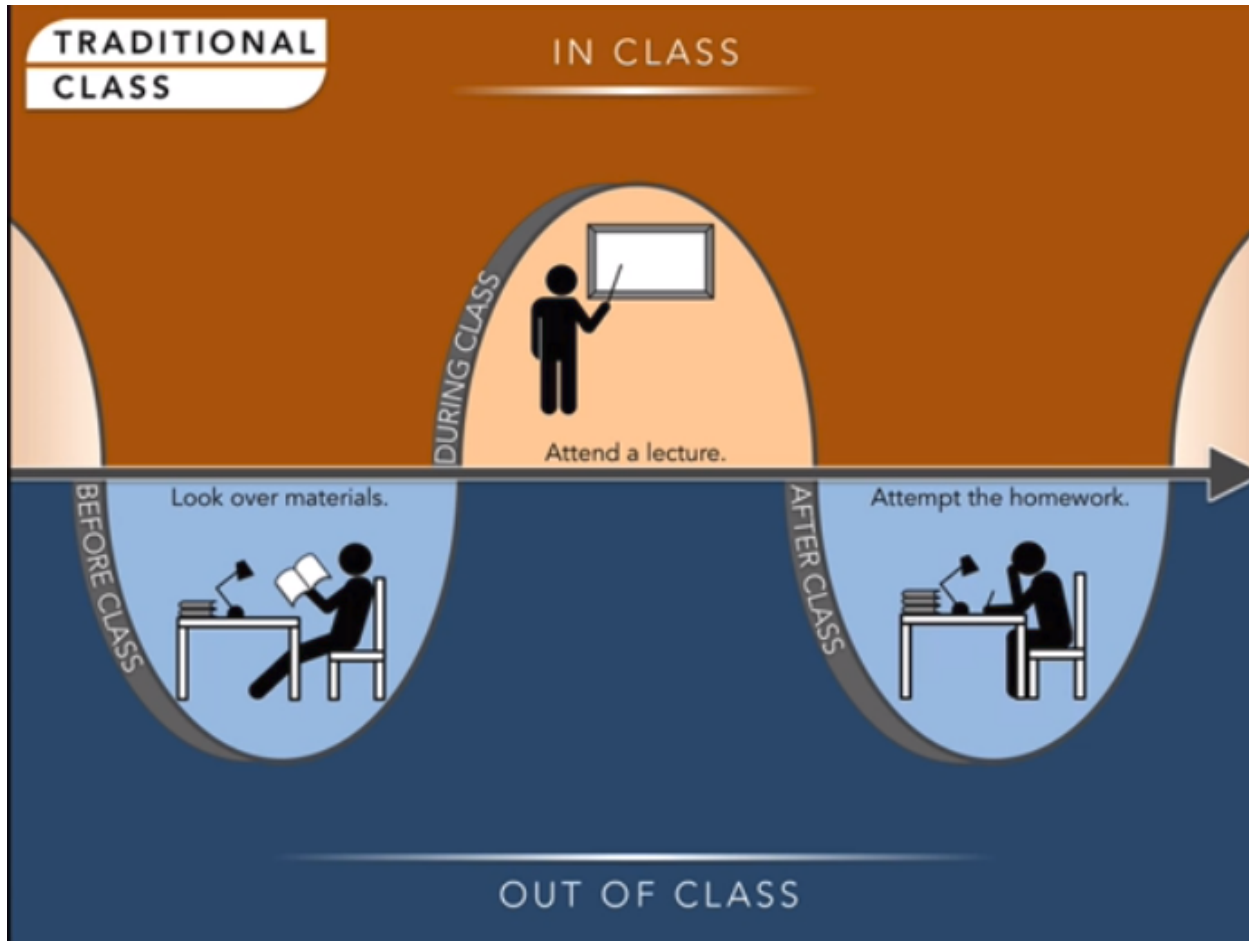
In-class online activities:

- PreQuiz using uReply
- PostQuiz using uReply
- Peer Instruction using uReply
- Kahoot! game
- Polling
- Watching youtube video
- Posting on Virtual Whiteboard
- Breakout room for discussion

Out-of-class online activities:

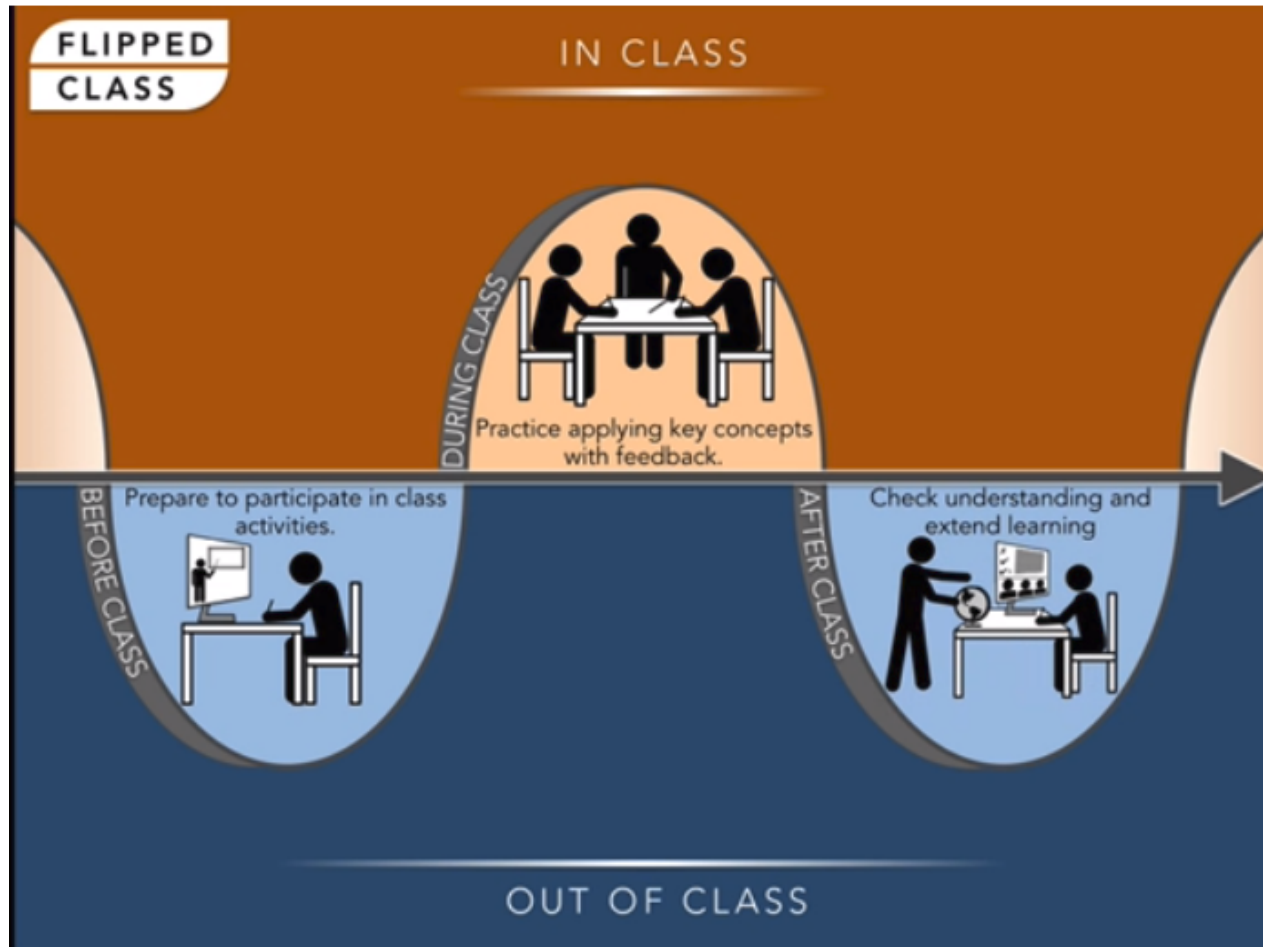
- Video lectures for flipped classroom
- Youtube video for pre-Lab
- Online discussion forum
- Online consultation session
- Recorded lectures for revision
- SQL Challenge Game

What is Flipped Classroom?



<https://facultyinnovate.utexas.edu/flipped-classroom>

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Go to Blackboard > T&L Project

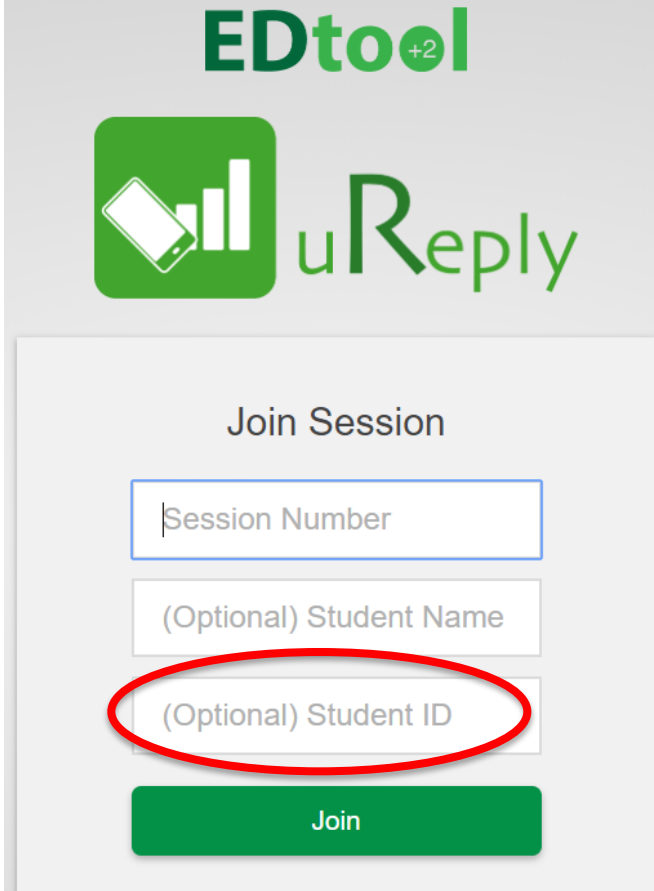
- Information Sheet & Consent form
 - Please read the information sheet now and sign the electronic consent form to consent your participation in this project.
- Entrance Survey

First try with Clickers (uReply)

Go to the following link using your mobile device or desktop computer:

<https://ed2.polyu.edu.hk/student/>

Please input your Student ID for record.

The image shows a mobile application interface for 'EDtool +2' and 'uReply'. The 'uReply' logo features a green square with a white smartphone icon and a bar chart. Below the logo, the text 'Join Session' is centered. There are three input fields: 'Session Number', '(Optional) Student Name', and '(Optional) Student ID'. The 'Session Number' field has a cursor. The '(Optional) Student ID' field is circled in red. At the bottom is a green 'Join' button.

EDtool⁺²

uReply

Join Session

Session Number

(Optional) Student Name

(Optional) Student ID

Join