Subject Description Form

Subject Code	COMP311
Subject Title	Foundations of Database Systems
Credit Value	3
Level	3
Pre-requisite / Co-requisite/ Exclusion	Pre-requisite: COMP201 and COMP305 Co-requisite/Exclusion: Nil
Objectives	This subject provides students knowledge on: • design, develop, implement, and administrate a database system of considerable complexity; • possess enough background to evaluate various DBMSs of different data models and make the appropriate selection for an organization.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: *Professional/academic knowledge and skills* (a) acquire a good understanding of the architecture and functioning of database management systems, as well as to be able to use the associated tools and techniques; (b) understand and apply the principles and practices of good database design and analysis; (c) recognize the direction of database technology and their implication so as to manage and plan database system developments. *Attributes for all-roundedness* (d) appreciate development of database technologies for lifelong learning, e.g., web databases; (e) build up on team spirit, presentation and technical writing skills. **Alignment of Programme Outcomes:** Programme Outcome 1: communicate effectively in Chinese and English at a level sufficient for project and system presentation and documentation. This subject teaches elements of this outcome and provides practice for the students on this outcome as well as providing an opportunity to measure parts of the outcome. Programme Outcome 4: think and reason critically on developing alternatives in

	problem solving and application development, and be able to design and evaluate for the proper solution by applying computing and related technologies. This subject teaches elements of this outcome and provides practice for the students on this outcome. Programme Outcome 5: possess technical knowledge needed to solve computing problems and to realize solutions in programming and associated technology. This subject teaches elements of this outcome and provides practice for the students on this outcome. Programme Outcome 6: be responsive to and follow closely the advancement in information technology and their impact to the industrial need for information technology, with an attitude of continuous and lifelong learning. This subject teaches elements of this outcome and provides practice for the students on this outcome. Programme Outcome 7: work together as a team in project design and development, while exhibiting leadership in a group or team whenever designated or necessary. This subject teaches elements of this outcome and provides practice for the students on this outcome.
Subject Synopsis/ Indicative Syllabus	**Topic** **1. Basic concepts of database system** Database and its applications; DBMS design objectives and its components; ANSI/SPARC three-level system architecture; data independence. **2. Database design** Entity-relationship model; functional dependencies; normalization. **3. Relational data model** Relational structure; relational languages: relational algebra, relational calculus, SQL; relational constraints: entity constraints, referential integrity constraints and foreign keys. **4. File structures and physical database design** File organization; indexing and hashing. **5. Application designs and query processing** Relational view definition and management; equivalence of expressions, estimation of query-processing cost, join strategies; database and the World Wide Web; embedded SQL and ODBC. **6. Implementation issues** Buffer management; transaction processing; concurrency control; crash and recovery; security and integrity.

Laboratory Experiment:

There are two types of laboratory/tutorial sessions:

- Practice of technical skills such as database CASE tools, SQL and application programming.
- Reinforce design and analysis skills through group interactions, presentations and prototype demonstrations.

Case Study:

Real-life/industrial database application development examples will be discussed in classes and/or tutorials when appropriate.

Teaching/Learning Methodology

Lectures give the basic principle and knowledge of database. Labs guide student how to use programming tools to design a database. The project tests students' learning on the whole subject.

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed (Please tick as appropriate)					
		a	b	c	d	e	
1. Assignments	55%	✓	✓	✓			
2. Lab exercises		✓	✓				
3. Project		✓	✓	✓	✓	✓	
4. Mid-term		✓	✓				
5. Examination	45%	✓	✓	✓			
Total	100 %						

Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes:

Assignments are for students to practice their technical skills.

Quizzes are to encourage students to have a consistence study pace.

The term project includes database design and analysis as well as verbal and written presentations.

Student Study Effort Expected

Class contact:	
▪ Lecture	39 Hrs.
▪ Lab	13 Hrs.
Other student study effort:	
▪	Hrs.
▪	Hrs.

	Total student study effort	42 Hrs.
Reading List and References	**Textbooks:** 1. Michael Manning. Database Design, Application Development, & Administration, 3rd (international) edition, McGraw-Hill, 2007. **Reference Books:** 1. David Kroenke**.** Database Processing: Fundamentals, Design and Implementation, 11th edition, Prentice Hall, 2010. 2. A Silberschatz, H.F. Korth, S. Sudarshan. Database System Concepts 6th Edition. McGraw Hill, 2011. 3. Hector Garcia-Molina, Jeffrey D. Ullman & Jennifer Widom. Database System Implementation, Prentice Hall, 3rd edition, 2008. 4. C. J. Date. An Introduction to Database Systems, Addison-Wesley Longman, 2004.	