COMP9020 Foundation of Computer Science

Textbook:

Extra reading:

Topics:
- Sets, functions and sequences
- Logic for proofs
- Basic relations
- Induction and recursion
- Recurrences: solutions and their order of growth
- Structured counting procedures
- Combinatorial principles
- Graphs and trees
- Random events
- Random variables and expected values
- Boolean expressions
- Algebra of relations

COMP9021 Principles of Programming

Textbook:

*The Python Tutorial*: [https://docs.python.org/3.4/tutorial/](https://docs.python.org/3.4/tutorial/)

Extra reading:
- Brad Miller and David Ranum, *Problem Solving with Algorithms and Data Structures Using Python* [http://runestoneinteractive.org/library.html](http://runestoneinteractive.org/library.html)

**Topics:**

- Variables, Control Flow
- Builtin Types: Lists, Tuples, Dictionaries
- Functions
- Files
- Objects, Inheritance
- Recursion
- Linked lists
- Stacks, Queues
- Heaps
- Trees, Binary search trees
- Sorting

### COMP9024 Data Structures and Algorithms

**Textbook:**

Data Structures and Algorithms in Java (4th edition) by Goodrich and Tamassia, Wiley

**Topics:**

- Elementary data structures: implementation and analysis.
- Stacks, deques and lists. Arrays versus linked structures.
- Analysis of algorithms.
- Internal and external searching and sorting.
- Java: inside classes, control statements, operators, primitive types, exceptions, arrays, class Object, packages, simple IO.
- Graphs: Representation, implementations and operations.
- Elementary graph algorithms.

### COMP9032 Microprocessors and Interfacing

**Textbook:**


**Topics:**

- AVR Assembly Programming
- Interrupt System
- Serial Communication
- Analog Input/Output
- Instruction Set Architecture

**COMP9311 Database Systems**

*Topics:*
- Data modelling
- Principles of database design
- Data manipulation languages
- Database application techniques
- Introduction to DBMS internals
- Introduction to advanced databases
- Design and implementation of a database application using SQL and stored procedures

**COMP9414 Artificial Intelligence**

*Textbook:*


*Topics:*
- Prolog programming: terms, rules, recursion, the cut
- Rule-based systems
- Frames and semantic networks
- Search
- Basic search algorithms (depth-first, breadth-first, best-first, hill climbing)
- A* search, adversarial search (minimax, alpha-beta)
- Propositional logic: Truth table semantics, logical equivalence, soundness and completeness, propositional resolution
- First-order logic: Quantifiers and scope, interpretations, logical equivalence, first-order resolution, relation to Prolog
- Reasoning under uncertainty: Bayes’ rule, conditional independence, computing with probability tables
- Machine learning: Error backpropagation learning in feedforward network creating decision trees - the ID3 algorithm
- Natural Language Processing: Linguistic basics context-free grammars parsing using
- raw Prolog
- logical form
- lambda-expressions and their use in logical forms
- semantic interpretation of simple sentence
COMP9331 Computer Networks and Applications

Textbook:


Topics:

• Internet Protocol Architecture
• Circuit and Packet Switching
• Application Layer
• HTTP
• E-mail
• FTP
• Peer to Peer Networks
• DNS
• Transport Layer Principles
• TCP
• UDP
• Congestion Control
• IP
• Network Layer Principles
• IP Addressing
• Virtual Circuits
• Routing Algorithms
• Link Layer Services
• Multiple Access Protocols
• Link Layer Addressing
• Ethernet
• Hubs and Switches
• IEEE 802.11 Local Area Networks
• Network Security Basics
• Public and Private Key Cryptography
• Digital Signatures
• Authentication, Firewalls