**Course: CompSci 225**

**Discrete Structures in Computer Science, Semester 1, 2015**

**Description**: This is a *challenging* course that aims at studying discrete structures relevant to computer science and mathematics. You will learn to reason about discrete objects (e.g. programs) along with giving formal definitions to various concepts. You will study the basics of arithmetic, graphs, trees, some known algorithms (e.g. Euclidean algorithm, Dijkstra's algorithm), proofs, induction, finite state machines, logic, counting and probability. An emphasis is placed on proving correctness of algorithms.

**Content**: 1) The concepts of definition, theorem, and proof. 2) Basics of arithmetic. Euclidean algorithm. 3) Basics of graph theory. Directed and undirected graphs. The path problem. Components of graphs. Euler circuits. 4) Trees. Induction on trees. Expression trees. 5) Sets and relations. Operations on sets. Types of relations. Partial orders and equivalence relations. Relational calculus. 6) Induction and correctness of programs. Loop invariants. 7) Spanning trees. Shortest path problem. 8) Propositional logic. 9) Functions. 10) Finite automata. 11) Elements of probability.

**Assignments**: There will be 8 assignments with the following due dates: March 10, March 17, March 24, March 31, April 21, May 5, May 19, and May 26. All assignments are due 4pm on the specified days. Submit your assignments through the student Resource center of the Faculty of Science.

Most of the assignment solutions will be explained in the tutorials. Therefore, written solutions will not be provided.

**Assessment:** Assignments: 30%, Test 25%, and Exam: 45%.

**Test:** April 28 (Tuesday); Time: 7pm-8pm; Room: HSB1/201N.

**Required Textbook**: *Lectures on Discrete Mathematics for Computer Science*. Authors: Bakhadyr Khoussainov and Nodira Khoussainova. World Scientific. Singapore. Available at the University bookstore.

**Lecturer and supervisor**: Prof. Bakhadyr Khoussainov, The University of Auckland. The contact info:

Lecturer: Prof. Bakh Khoussainov:
email: bmk@cs.auckland.ac.nz
Office: CS Building, floor 5, room 303 581.
Office hours: Thursdays: 3pm-4pm.

**Guest lecturer**: (joining by Skype): Dr. Nodira Khoussainova, Twitter corporation.

**Lectures**: Three lectures per week on Tuesdays (General Library, Room B10), Thursdays (General Library, Room B10) and Fridays (Sci Maths and Physics, Room G23). All lectures run from 3pm to 4pm.

**Tutorials**: There will be 7 classes. Each class will have one tutorial per week. The classes are on Mondays (2pm-3pm and 3pm-4pm), Wednesdays (10am-11am), Thursdays (10am-11am and 11am-12non), and Fridays (10am-11am and 11am-12noon). For the tutorial classes talk to your tutor. Select the one that suits you the most but we try to distribute the students equally to each class. Here is the contact info for teaching assistants:

Tutor: Dr. Dimitry Berdisnky:
email: berdinsky@gmail.com
Office: CS Building, floor 5, room 303 596 (PhD students room).
Office hours: Wednesday 4-5PM

Tutor: Michael Kokho:
email: m.kokho@auckland.ac.nz
Office: CS Building, floor 5, room 303 596 (PhD students room).
Office hours: Thursdays 10-11AM.

Tutor: Yan Kolezhitskiy:
email: ykol002@aucklanduni.ac.nz
Office hours: Wed 11am-12 (Contact by email to set up a meeting place).

Tutor: Helen Zhao:
email: jzha582@aucklanduni.ac.nz
Office hours: Friday 12-1PM (Contact by email to set-up a meeting place).