# *CPS3233 – Verification Techniques Assessment*

Assignment instructions (read carefully and thoroughly):

- This is an individual assignment and carries 100% of the final CPS3233 grade.

- This assignment consists of multiple tasks. While it is strongly recommended that you start working on the tasks as soon as the related material is covered in class, the firm submission deadline for all tasks is **Friday 27th April 2018**. A hard copy of the report should be handed in at Mr Kevin Cortis' office.

- A backup submission for each task, that includes a soft-copy of the report and all relevant files, should be uploaded to the VLE by the applicable deadlines. All files must be archived into a single .zip file.

- You are to allocate 100 hours to complete this assignment, including 70 hours for independent study.

- The first page in your assignment report must be the title of your assignment clearly showing your name, surname and study unit code.

- Reports that are difficult to follow due to low quality in the writing-style/organization/ presentation will be penalized.

## Specify the elevator system (25%)

The first part of the assignment consists of specifying the elevator system (see the attached document providing more information) using different formal notations which are covered in class:

1. Finite state automata
2. Regular expressions
3. Computation tree logic (CTL)
4. Linear temporal logic (LTL)
5. Duration calculus
6. Timed automata

**Deliverable:** In each case, you are expected to give informal explanations of how the formal notation corresponds to the intuitive meaning.

## Runtime verification (25%)

Once we have specified the elevator system, we can attempt to monitor the elevator behaviour according to the formal properties. In this section, you are expected to use a runtime verification tool (Larva will be covered in class) to show how the elevator system can be monitored.

**Deliverable:** A report explaining:

1. The script used for monitoring (using Larva script, based on timed automata).
2. How you ensured that the monitor is working correctly.
3. What could have been done better.

## Model-based testing (25%)

Following runtime verification, we turn our attention to test the formal properties by generating inputs to simulate the elevator behaviour (using structures inspired from finite state automata). In this section, you are expected to use a model-based testing tool to test the properties, generating test sequences intelligently.

**Deliverable:** A report explaining:

1. What has been tested and how (explaining the model used).
2. Why you think the testing carried out is adequate (test coverage, etc).
3. How it was ensured that testing worked correctly (did your approach detect bugs?).

## Model checking (25%)

As a last step, you are expected to build a model of the elevator system and perform model checking of CTL/LTL properties as explained in the exercises in the slides provided.

**Deliverable:** A report answering the questions in the slides with sufficient explanation as required.