Exam Topics

Preparatory Course
Computer Science and Mathematics

Variables and Control Statements

- Given a script: Describe what it does and which values its variables have at the end. This includes the variables' data type.

- Write a short script that accomplishes a simple task using *if* and *else*

Loops and Lists

- Given a script: Describe what it does and which values its variables have at the end. This includes stating the number of iterations as well as entries in a list.

- Write a short script that manipulates each item in a list using a for loop.

Trigonometry

- Given some angles or side lengths. Calculate other side lengths or other angles in a right triangle.

- Given are two vectors, calculate the angle between them.

Functions

- Sketch a function plot by calculating a few points and drawing the connections.

- Tell if a function is bijective, surjective injective, monotonically increasing/decreasing.

- Translate, stretch or mirror a given function by applying the appropriate formula.

Derivatives

- Calculate the derivative of a function. Use multiplication, division or chain rule if applicable.

- Calculate the position of local extrema of a function given its derivative.

Integration

- Calculate the area under a function curve in a given boundary. The anti-derivative will either be given or can be calculated using the reverse exponent rule.

Differential Equations

- Locate attractor and repellor points in a given phase plot ($f'(x)$ vs. $f(x)$).

- Calculate an Euler approximation of a differential equation for a few number of times with a given step size and starting value.

Allowed materials:

Pen, pocket calculator and one DIN-A5 sheet with hand written notes (one sided)