Computational thinking is a set of concepts and practices that draw on ideas from the world of computing. There has been a growing recognition of the importance of computational thinking for understanding and solving problems in a wide range of contexts, not only in the field of computer science. Programming can serve as an important context for the cultivation of computational thinking. In this workshop, we take an explicitly design-based learning approach to understanding computational thinking concepts and practices through programming.

**COMPUTATIONAL CONCEPTS**

Here are a few of the computational concepts that we will be exploring during the workshop:

- **sequence**
  identifying a series of steps for a task

- **loops**
  running the same sequence multiple times

- **parallelism**
  making things happen at the same time

- **events**
  one thing causing another thing to happen

- **conditionals**
  making decisions based on conditions

- **operators**
  support for mathematical and logical expressions

- **variables**
  storing, retrieving, and updating data

- **lists**
  a structure for organizing a collection of items
COMPUTATIONAL PRACTICES

The process of putting these computational concepts into action is supported by particular computational practices. These problem-solving practices include:

- **incremental/iterative**
  developing a little bit, then trying it out, then developing some more

- **testing/debugging**
  making sure that things work – and finding and fixing mistakes

- **reuse/remix**
  making something by building on what others – or you – have done

- **abstraction/modularization**
  building something large by putting together collections of smaller parts

LEARNING APPROACHES

What are particularly effective ways of exploring computational concepts and practices? Learners should have opportunities to engage in experiences based on:

- **design**
  creating things, not just using or interacting with things

- **interests**
  creating things that are personally meaningful and relevant

- **collaboration**
  working with others on creations

- **reflection**
  reviewing and rethinking one’s creative practices