NUS SOC Summer Workshop 2025

Solving Real World Problems with Computational Thinking

X-Cluster

Course Information

Pre-requisites:

- Which year of study is appropriate for your topic?

  Year 1. (Maybe some Year 2)

- What background and programming languages are required for your topic?

  High school mathematics, an open mind, and good sense of humour.
  Programming background is helpful but not necessary.

- What do you think is attractive/unique about your topic?

  This course will help you to fall in love with a new thinking skill -- CT (computational thinking).

  You will learn to analyze a real-world problem and learn to formulate appropriate computational problem(s) to solve that will help solve (some aspect of) the real-world problem.

  You will experience a free and open learning environment where you can freely express and exchange ideas, brainstorm multiple solutions and learn creative problem-solving methods in small group discussion sessions.

  This course will help to cultivate important learning attitudes and life skills – to be an independent learner, to take initiative, to develop a growth mindset. To learn about teamwork, being a good team player, and how to give good presentations.

  (Sample feedback from a Summer-2019 student:

  This course is amazing. I have never realized that computer science can be so interesting. When I deal with our mini-project, I also used what I had learned before, such as programming language and discrete mathematics which applied what I have learned.)

NUS SOC Summer Workshop 2025

Solving Real World Problems with Computational Thinking

X-Cluster

Course Information

Learning content and Teaching

- What will be covered during the introductory lectures?

  - Introduction to CT (Computational Thinking).
  - Case Study of using CT to solve real-world problems.
  - MatheMAGIC -- Creative problem-solving using mathematics

- What will be covered during the advanced seminars?

  More in-depth coverage of the topics mentioned in the synopsis, including Computational Thinking, Problem Formulation, Problem Modelling, Polya Problem Solving Process, Algorithm Design, Teamwork, Good Learning Attitudes, Growth Mindset, and also fun topics such as MatheMAGIC, CS-Unplugged, and more.

- What will students be doing for the project work? How do you intend to split students into project groups?

  Students will work in teams of 4 students each. We will split the students into teams so that there will be **maximum diversity**, in terms of university, major, year of study, gender, and major.

- Do you have any recommendations for references (books) where students can study to prepare for this topic beforehand?

  No reference book on this topic. But some introductory material on CT can be found here:

  Wing, J. M. (2006). Computational thinking. *Communications of the ACM, 49*(3), 33–35. https://doi.org/10.1145/1118178.1118215.

  Wing, J. M. (2011). Research notebook: Computational thinking—what and why. *The Link Magazine*, Pittsburg, PA. Retrieved from https://www.cs.cmu.edu/link/research-notebook-computational-thinking-what-and-why. Accessed 17 Feb 2023.

NUS SOC Summer Workshop 2025

Solving Real World Problems with Computational Thinking

X-Cluster

Course Information

- Apart from a laptop/computer, is there any other equipment/software required for this topic?

  Personal laptop will be enough. Come with Open Mind to learn, to communicate.