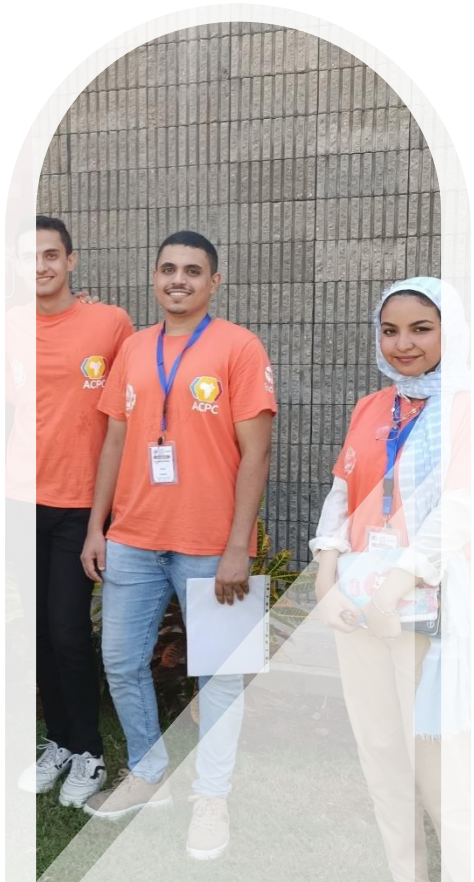
Problem Solving

# INTRODUCTION

FRI, 13 NOV 2021

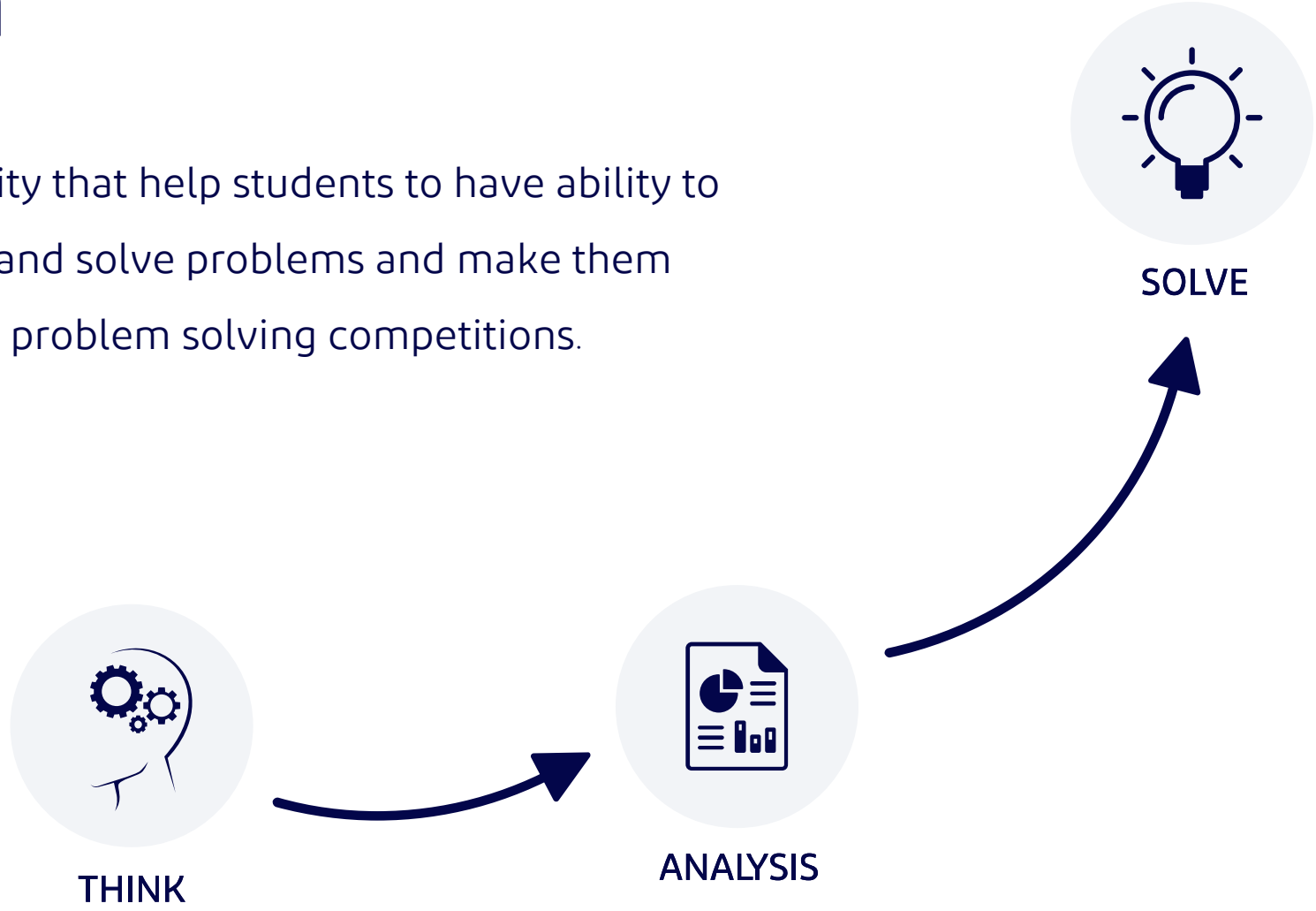


# About Us

- We are FCI-FU final year students.
- We participated in ECPC 2019/2020 and 2020/2021.
- Some of us got seventh place in ECPC qualifications 2019/2020.
- Some of us got third place in ECPC qualifications 2020/2021.
- Two of us made it to the top 10 of the ECPC 2020/2021 Qualifiers.

# Vision

Build community that help students to have ability to think, analysis and solve problems and make them ready to join in problem solving competitions.



# Mission

Make weekly two-level sessions and creating competitions that simulate the ECPC competition.

**01.**

Basic of Programming in C++

**02.**

Problem Solving

# Problem Solving

What and Why?

# Programming Competition

What and Why?

# Programming Competitions

- Programming Competitions (Competitive programming) is a mind competition and it is a hobby and much fun for many.
- Competitions is your gateway to do much practice to build Algorithmic Solving skills.
- Competition can be individuals or teams and online or onsite.

# Competitions Styles

## Offline

- ICPC (College Level).
- IOI (Secondary School).

## Online

- Codeforces.
- Hackerrank.
- UVA.
- SPOJ.
- LeetCode.

## Programming Languages

- **C++** and **Java** are the most popular languages in Programming Competitions (main in ICPC).

* Python is also used in competitions but it is not recommended.

# ICPC Competition

- International Collegiate Programming Contest
- (ICPC) is the oldest, largest, and most prestigious programming contest. It is a Battle of the Brains.

# ICPC Levels

**01.** Qualifications are made in which all universities compete, and 10% of the number of participating teams qualified for each university.

**02.**
- Each country has formal national competition.
- ECPC (Egypt), LCPC (Lebanon), ...etc.

**03.**
- Nationals Winners qualified to regional.
- ACPC: Arab Collegiate Programming Contest.

**04.** Winners in the regions are qualified to World Finals.

Local competitions → National Level → Regional Level. → World Finals.

# Gains from competitions

- Speed, Coding, Debugging, Testing Skills.
- One critical gain from competitions is the increase of your tools (data structures, algorithms, tricks and workarounds, .... etc.)
- Teamwork working under pressure.


- The skills acquired in programming contests also improve career prospects, as they help to pass the "technical interviews", which often require candidates to solve complex programming.

# Content

# **LEVE 1:** Basic of Programming in C++

This level is an introduction to the fundamentals of computer programming, It is specifically designed for students with no prior programming experience.
This level uses C++ for implementation.

**Duration**

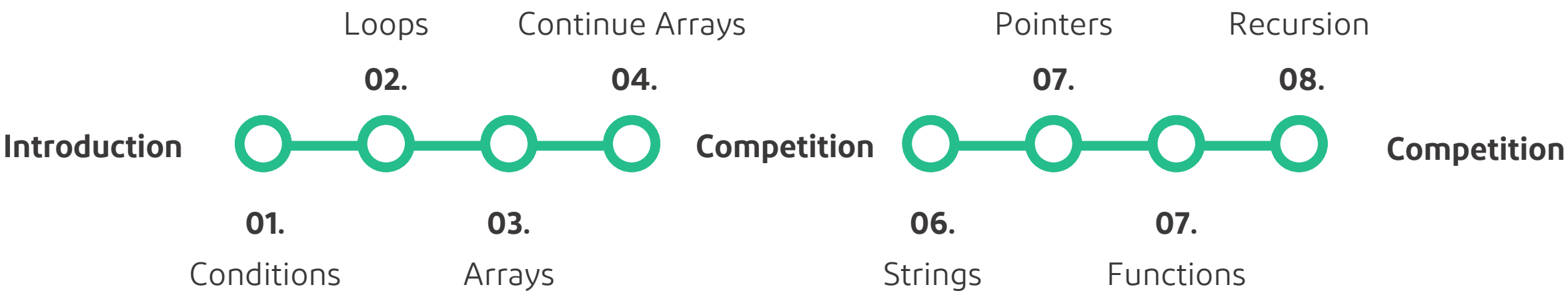
- 8 sessions
- 1 session per week
- 3 Hours for each session

# Content

- Condition.
- Loop.
- Arrays.
- Strings.
- Pointer.
- Time complexity.
- Dynamic memory.
- Functions.
- Recursion.

# Our Schedule

(First semester)



# **LEVE 2:** Problem Solving

This course aims to prepare students in competitive problem solving. It will benefit students who want to compete in ICPC.

This level uses C++ for implementation.

**Duration**

- 8 sessions
- 1 session per week
- 3 Hours for each session

# Content

First semester

- STL.
  - Vector, Map, Stack, Queue, etc.
- Frequency Array.
- Prefix and Suffix Sum.
- Partial Sum.
- Binary Search.
- Two Pointers.
- Complete Search.

# Content

Second semester

- Math.
  - Basic of counting.
  - Modular athematic.
  - Arithmetic and geometric progression.
  - GCD && LCM.
  - Factors.
  - Primes.
  - Sieves
- Greedy.
- Dynamic Programming.
- Graph.

# Our Schedule

(First semester)

# References

## Online Judges

- Codeforces.
  - https://codeforces.com/
- Hackerrank.
  - https://www.hackerrank.com/dashboard
- vjudge.
  - https://vjudge.net/
- URI.
  - https://www.beecrowd.com.br/judge/en/login
- UVA Online Judge.
  - https://onlinejudge.org/

## Videos

- ICPC.
  - https://www.youtube.com/watch?v=TngPtAFRcbE
- What is Codeforces.
  - https://www.youtube.com/watch?v=7y6jB16zVl8
- Other Online Judges.
  - https://www.youtube.com/watch?v=hc_GdHypDqU
- Installing CodeBlocks.
  - https://www.youtube.com/watch?v=EGMLIhuNNGo

# THANKS!

Any Questions?!