

# Syllabus

## Olimpiadi di Informatica a Squadre

Version 2 --- May 19th, 2019

### *Level 1.*

- Primitive data types (e.g. int, char, double, bool)
- One-dimensional arrays (e.g. int[], char[], double[], bool[])
- Branching (if/else statement)
- Bounded loops (simple for statement)

### *Level 2.*

- Multi-dimensional arrays (e.g. int[][])
- Queue and stack data structures
- Unbounded loops (while statement)
- Functions and exhaustive recursion (e.g. listing permutations)
- Binary search
- Quadratic sorting algorithms (e.g. bubble sort)
- Strings and quadratic substring search
- Euclidean algorithm for the greatest common divisor
- Basic concepts of geometry and arithmetic

### *Level 3.*

- Standard containers (e.g. vector, set, map)
- Divide et impera
- Dynamic programming on one- or multi-dimensional arrays
- Graph traversals (BFS, DFS)
- Efficient sorting algorithms (sort or qsort)
- Approximate optimization through heuristics techniques

### *Level 4.*

- Disjoint-set data structure (union-find)
- Data structures for range queries
- Least common ancestor in trees
- Graph algorithms: shortest path, spanning tree
- Dynamic programming on acyclic graphs
- Backtracking (branch and bound algorithms)

### *Level 5.*

- All other topics not mentioned in previous levels