

# 122COM: Introduction to algorithms

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# Overview

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Introduction to algorithms module.

- What is an algorithm?
- Not the same as code.
- Not the same as a program.

A task is a problem that needs to be solved.

- I.e. bake me a cake.

An algorithm is a generalised set of instructions to perform a specific task.

- A strategy to solve a given problem.
  - Many different strategies to solve same task.
- Like a recipe.

Code is a specific set of instructions to perform a specific task.

- An implementation of a strategy in a specific language/system.
- Have to adapt the recipe to your kitchen/oven etc.

# Fibonacci sequence algorithm

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**Task** - calculate the fibonacci sequence.

## Algorithm

- 1 Starting with 0 and 1.
- 2 Sum the two numbers to make a third.
- 3 Discard the lowest number.
- 4 Repeat from step 2.

## Code

```
def fibonacci( a, b ):
    c = a + b
    a, b = b, c

    print( a )
    fibonacci( a, b )

fibonacci( 0, 1 )
```

```
for( int a=0, b=1, c;
    a>=0;
    c=a+b, a=b, b=c )
{
    cout << a << endl;
}
```

## Module content

Looking at search algorithms today.

Looking at sorting algorithms in a later week.

Will be tested on some algorithmic concepts.

- Implement simple algorithms.
- Describe advantages/disadvantages of certain algorithms.
- Big  $O$  notation.
  - How algorithms scale.
- Calculate an algorithms  $O()$  notation.

## Thinking algorithmically.

- Learning how to break down a problem into small steps.
- Think through algorithms.
- Evaluate algorithms.
  - Does this algorithm actually work?

# The End