- COE 312 (Data structures)

- Close loop in this class
Computer Programming (COE 212): Java
Arithmetic expression
Interactive programs (Scanner)
Built-in Java classes (Random, Math, DecimalFormat, NumberFormat, and Wrapper classes)
Write classes
Repetition statements and conditionals (?:)
Class Relationships (uses, is a (Inheritance), has a): params are passed by value

```
public static void main(String[] args) {
        int[] num1 = new int[1]
}

static void swap(int[] val1, int[] val2) {
        int temp = val1;
        val1 = val2;
        val2 = temp;

}
```

Arrays: Static index-based data structure
`int[] arr = new int[3];`
arr is storing the address of the first value in the array.

`arr = new int[5];`

Dynamic list: ArrayList (class) ---> CRUD: Create, Read (get), Update, Delete (Efficiently)

Sorting + Searching:
Sorting: Insertion, selection, bubble, counting, etc...
Searching: Linear (O(n)) and binary search (O(log2(n))

- Pillars of the course:
1. Data structures: Collection of data (database) --->
2. Algorithms: Step by step process to solve a problem

- How do you measure the goodness of an alogrithm?
a. Time complexity
b. Space complexity: auxilliary data structure ?

- Objectives?
1. Introduce the most commonly used data structures (Stacks, queues, maps, sets, etc...)
2. Every data structure has some cost + benefits associated with it
3. Analyse the running time and space complexity of a given algorithm

Coding

Competitive programmers: CM, Masters, Grand Masters

- Problem solving:
Find duplicate number Leetcode:
General rule of thumb: Make it work and then make it better

Brute-force solution (Make it work)