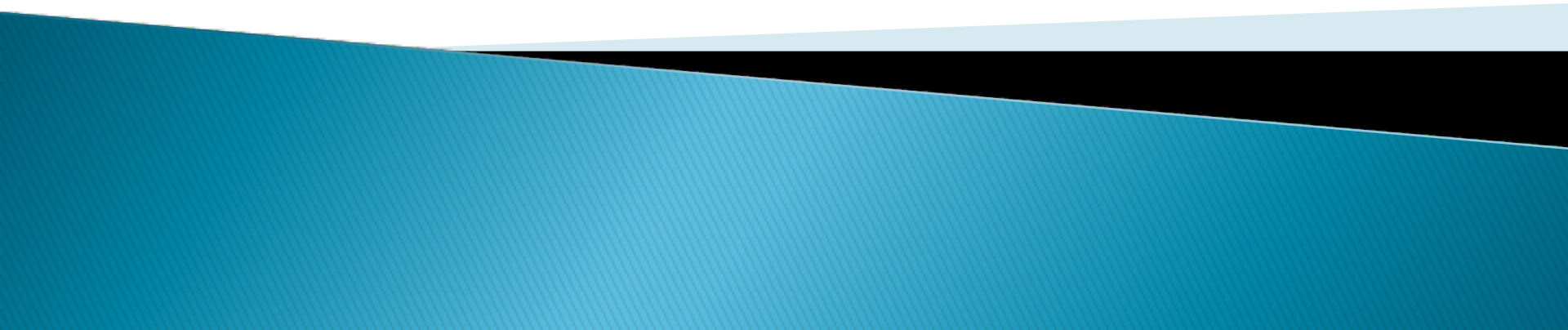


# 41012 Programming for Mechatronic Systems

Tutorial: Week 5



# Task 1: STL Vector Operations

- ▶ Create Functions that:
  1. Accept a vector and modifies it with
    - a) Makes random numbers of elements of vector      select number form uniform distribution (0–10)
    - b) Each element is a random number drawn from Gaussian distribution (mean: 8, std dev 4)
  2. Accept a vector and rearrange elements
    - Perform a bubble sort operation
      - ([https://en.wikipedia.org/wiki/Bubble\\_sort](https://en.wikipedia.org/wiki/Bubble_sort))
- ▶ Create Main that:
  - Calls above functions
  - Prints the vector after populating it and after sorting
- ▶ Use vector of doubles for above
- ▶ Can you modify the code to use a vector of integers instead?


# Task 2: Using containers for classes

## ▶ Exercise:

- Using the Rectangle, Triangle, Circle Classes (from Shape Base Class)
- Compute the total area of the shapes on the board

## ▶ Instead of using an array, can we use a vector?

## ▶ Questions

- Can we also create a Shape object?
  - What is the point of the Shape parent class here?
  - Can we write our code to be shape agnostic?
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# Task 3: Using Template Functions

- ▶ Create a class Student
    - Members: ID , Surname
    - Allow initializing in Constructor
    - Setter and Getter methods
  - ▶ Using a Vector as a Container and templates allow
    - Bubble sort by ID/Surname
  - ▶ Create a Main that allows:
    - Initializing a number of student classes
    - User to specify the sorting method
    - Prints students prior and after sorting
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