

# **ED1021 - Introduction to computation and visualisation**

**Ramanathan Muthuganapathy (<https://ed.iitm.ac.in/~raman>)**

**Course web page: <https://ed.iitm.ac.in/~raman/introcomp.html>**

**Moodle page: Available at <https://courses.iitm.ac.in/>**

- L1 - Introduction & Algorithms
- L2 - More on Algorithms & Flowchart
- L3 - Flowchart and Basic programming fundamentals - Constants
- L4 - Programming basics - Variables
- L5 - A.E., Sample programs, statements, input and output syntax
- L6 - Conditional Statements
- L7 - Loops
- L8 - Arrays - Single and Multi-dimensional
- L9 - Processing Characters / Strings
- L10 - Functions and associated details
- L11 - Introduction to OpenGL and sample programs.
- L12 - Basics of pointers
- L13 - Arrays and Pointers
- L14 - Dynamic memory allocation
- L15 - Structures
- L16 - Array of structures

- L17 - Pointers and Structures
- L18 - Pointers, structures and functions
- L19 - Self referential structures
- L20 - Data structure - Linked list
- L21 - Variants of linked list
- L22 - File operations

# Class schedule

	8.00-8.50	9.00-9.50	10.00-10.50	11.00-11.50	12.00-12.50	14.00-14.50	15.00-15.50	16.00-16.50	17.00-17.50
Mon	MA1102	MA1102	Course1	ED1021	Course2 ED1021	GN1102	<del>ED1021</del>	Course2	
Tue	MA1102	Course1	ED1021	ED1021	MA1102	ED3170 LAB	<del>ED1021</del> ED3170 LAB	Course2 ED3170 LAB	
Wed	Course1	ED1021	<del>ED1021</del>	Course1 ED3170	MA1102	GN1102	Course1	EXTRA	
Thu	<del>ED1021</del>	Course1 ED3170	Course2	MA1102	ED1021	GN1102			
Fri	Course1 ED3170	Course	MA1102	MA1102	Course	ED1021 LAB	ED1021 LAB	ED1021 LAB	ED1021 LAB

# Objectives of this course

- To make you strong in one programming language (in this course, we will use 'C'). You can then learn other languages somewhat easily.
- To eliminate the fear in you for programming by putting you through lab classes.
- We will see basics in graphics (Open Graphics Library, typically called as OpenGL) as an application of C language.
- Remember the following: PROGRAMMING CAN BE LEARNT ONLY BY PROGRAMMING.

# What is computer programming?

- Set of instructions to a computer written in 'English-like' language, typically called as High-level language, to achieve a specific task (e.g, from simple computing task of addition of two numbers all the way upto mimicking human brain).
- Design and build an executable computer program
- The 'program' that you write is called 'Source code'.
- Used in almost all forms of life: Games, Robotics, Modeling, Analysis. nowadays the popular ones such as machine/deep learning etc.

- Question: How do you draw a line on a computer screen?

- Question: Suppose you want to create a document (or letter). How do you do that? What will you use?



# Integrated Development Environment (IDE)

- Application that provides comprehensive facilities for software develop - writing source code, compiling, debugging, creating executable etc.
- Examples - Visual Studio, Xcode, Codeblocks, Xemacs, Kdevelop, Netbeans, etc.

# For Windows Users

## Microsoft Visual Studio

- Download Visual studio from <https://visualstudio.microsoft.com/>
- Install the VS

# For Mac users

- Use Xcode (Available in Appstore)
- Demo of Xcode

# Online C Compiler

- [https://www.onlinegdb.com/online\\_c\\_compiler](https://www.onlinegdb.com/online_c_compiler) (you can write the code there and press 'Run' to see how the code works)
- <https://www.codechef.com/ide>
- Use search 'Online C compiler' and try out more websites.
- HackerRank is another one.

# Course Contents

- C environment/Structured programming - C Standard Library, C data types, Operators, Expressions, Control statements (loops, break, exit, goto and continue statements), functions, arrays and pointers, dynamic memory allocation, structures, strings, file processing, basics of linked list and tree data structures.
- Introduction to OpenGL – OpenGL architecture, OpenGL geometric primitives, Transformations in OpenGL, GLUT programming.
- Go to <https://ed.iitm.ac.in/~raman>. Teaching --> Courses --> ED1021....

# Text Books

- V. Rajaraman, Computer Programming in C, Prentice-Hall of India Pvt. Ltd, 2004.
- Yashwant Kanetkar, Understanding pointers in C, BPB Publications, 1997.
- Mason Woo, Jackie Neider, Tom Davis, and Dave Shreiner. 1999. OpenGL Programming Guide: The Official Guide to Learning OpenGL, Version 1.2
- Type OpenGL redbook (<https://www.glprogramming.com/red/>) and then OpenGL examples.
- All examples are available at [https://www.opengl.org/archives/resources/code/samples/glut\\_examples/examples.html](https://www.opengl.org/archives/resources/code/samples/glut_examples/examples.html)

# Lab Sessions

- Questions will be made available in the moodle.
- All the source codes belonging to each lab class should be submitted before the deadline.
- Teaching Assistants (TAs in short) will be available for help / discussion. Each student will be assigned to a TA (the list is available in moodle).

ANY QUESTIONS?



# Algorithm

**E.g. Want to prepare Tea (first cut)**

- Take tea powder, mix it with milk and sugar.
- Boil them in a stove
- Serve the Tea.

# Algorithm

## Components of an algorithm

- Input(s)
- A set of clear, well-defined reproducible instructions and run in finite time.
- Output

# Algorithm

## Redoing the `Tea' example

- Inputs - Tea powder, milk, sugar, water.
- Take one cup of water, 1tsp of Tea powder, 1tsp of sugar, 1/4 cup of milk
- Mix them together and boil them for about 10 min in a gas stove.
- Output - Tea!

# Algorithm

## More examples?

**HW - Do the `example algorithm`  
problems.**