

Immaculate Conception High School
COMPUTER SCIENCE
 CAPE UNIT 2
 SEPTEMBER- DECEMBER 2023 TERM PLAN (TERM 1)

Date	Topics	Sub-Topics	Specific objective	Content	TEACHING STRATEGIES	Suggested Assessment	Assessment In-Class Activity
<p>Week 1 Sept. 5-8</p>	<p>Students should: Syllabus Content Overview and delivery sequence</p>	<p>Course Overview</p>		<p>Students will be informed of class rules, tools, study tips and Online tools: Google classroom, Schoology</p> <p>Tools: Textbook, Notebook, USB drive, Email Address etc.</p> <p>Overview:</p> <ul style="list-style-type: none"> ● Module 1: Data Structures ● Module 2: Software Engineering ● Module 3: Operating Systems & Networks 	<ul style="list-style-type: none"> ● Presentation ● Student Feedback ● QA section 		<p>Discussion</p>

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	IA Mark scheme Overview	Requirements of SBA		<ul style="list-style-type: none"> ● Specification of Requirements ● Design Specification ● Coding & Testing ● Communication & Presentation 	<i>Presentation, Discussion</i>		Oral questioning
<p>Week 2 Sept. 11-15</p>	<p><i>Understand the phases of software development life cycle</i></p>	<p>Lesson 1 <i>The reason for structured approach to the software development process</i></p> <ul style="list-style-type: none"> • Crises in Software development 	<ul style="list-style-type: none"> ● <i>Exploring the reason for structured approach to the Software development</i> ● <i>Understanding Increase dependency of computer systems.</i> ● <i>Identifying the reason behind previous crises</i> ● <i>Understanding the importance of the involvement of different stakeholder</i> 	<ul style="list-style-type: none"> • <i>increasing costs of software development; dissatisfaction of users and management with the quality and suitability of software; increasing Length and complexity of the software.</i> • <i>Requirements for standard interfaces, both to users and to other software</i> • <i>Need for tighter control and management of process; visibility of the process; risk</i> 	<ul style="list-style-type: none"> • Presentation • Discussion 	<p>Homework/ Assessment <i>Explore the history of software development and report what were some of the earlier issues.</i></p>	<p>In class Activity: <i>Students will be allowed to respond to questions on the early software crises.</i></p>

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			<i>management.</i>			
	Lesson 2 <i>Attributes of a well-engineered software product</i>	<ul style="list-style-type: none"> ● Identify and define the attribute of a well-engineered software ● Describe each attribute of a well-engineered software 	<ul style="list-style-type: none"> ● Maintainability ● Dependability ● Efficiency ● Usability ● Portability ● Availability of appropriate documentation 	<ul style="list-style-type: none"> ● Shared Discussion ● Cooperative learning ● Presentation 	Homework/ Assessment: Identify and critique well known software's then report on whether or not that software was well engineered	In class activity: Students will be placed in small groups to research then discuss the Attributes of a well-engineered software product then complete a worksheet consisting of CAPE past paper questions related to the topic.
	Less 3 Theory <i>Software Process Models</i>	<ul style="list-style-type: none"> ● State generic SDLC models other than the waterfall system ● Describe the characteristics of 	<ul style="list-style-type: none"> ● Waterfall Approach ● Fountain Approach ● Evolutionary Development 	<ul style="list-style-type: none"> ● Shared Discussion ● Cooperative learning ● Situated Cognition 	Homework/ Assessment: Continuing in groups of four (4), each group will prepare a	In class activity: Students will be placed in small groups to

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	<p>various generic SDLC models</p> <ul style="list-style-type: none"> ● Outline the advantages and disadvantages of the generics process models 	<p>(including prototyping)</p> <ul style="list-style-type: none"> ● Formal Transformation ● Reuse-oriented approach ● Spiral 	<ul style="list-style-type: none"> ● Presentation 	<p>presentation comparing the Waterfall Approach to another generic SDLC model</p> <p>Note: Students will present their findings at the next class.</p>	<p>research, then identify and discuss the characteristics of various generic SDLC models.</p>
<p>Lesson 3 Phases of the Waterfall Approach</p>	<ul style="list-style-type: none"> ● Outline the phases of the Waterfall Approach ● State the advantages and disadvantages of using the waterfall approach to software development ● Distinguish between the Waterfall Approach and other SDLC models ● Describe each phase of the Waterfall Approach 	<ul style="list-style-type: none"> ● Analysis phase (Requirements Analysis and planning) ● Design phase (System & Software Design) ● Implementation phase (Implementation & Unit Testing) ● Validation phase (Integration & System Testing) 	<ul style="list-style-type: none"> ● Shared Discussion ● Cooperative learning ● Presentation ● Demonstration 	<p>Homework/ Assessment:</p> <p>Research and make note of the importance of the need for the involvement of end users and management in the software development process</p>	<p>Students in small groups will be asked to draw and properly label a waterfall model on the board</p>

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				● Evolution phase (Operation & Maintenance)			
Week 3 Sept. 18-22	Outline the main deliverables in the Analysis Phase of the SDLC	Less 4 <i>Deliverables of the Analysis Phase</i>	<ul style="list-style-type: none"> ● Define the term Functional Requirements and Non-Functional Requirements ● Describe the importance of a Feasibility Report in the SDLC ● State two examples of Functional Requirements and Non-Functional Requirements each. 	<ul style="list-style-type: none"> ● Requirements Specification <ul style="list-style-type: none"> → Feasibility Report → Functional Requirements → Non-Functional Requirements 	<ul style="list-style-type: none"> ● Brainstorming ● Shared Discussion ● Cooperative learning ● Read Pause, reflect 	<p>Homework/ Assessment:</p> <p>Students will be placed in small groups to research then identify the main deliverables in the Analysis Phase of the SDLC and their purpose.</p> <p>Note: Students will share their findings to the class by hosting a shared discussion</p>	<p>In class activity:</p> <p>Group Presentations; on another generic SDLC model</p>
Week 4 Sept. 25-29	Outline the main activities and techniques used in the Analysis Phase	Lesson 5 <i>Techniques used in Software Engineering</i>	<ul style="list-style-type: none"> ● outlining the advantages and disadvantages, for each requirement 	<ul style="list-style-type: none"> ● Observation ● Interviews ● Questionnaire 	<ul style="list-style-type: none"> ● Collaborative learning ● Presentation 	<p>Homework/ Assessment:</p> <p>Students will research the tools used in the</p>	<p>In class activity:</p> <p>Students will be placed in small</p>

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	<i>of the SDLC</i>		<i>gathering technique used in the SDLC Analysis Phase</i>	<ul style="list-style-type: none"> ● <i>Internal Document Reviews</i> ● <i>Prototyping</i> 	<ul style="list-style-type: none"> ● Discussion ● Situated cognition ● Authentic learning 	<i>Analysis Phase of the SDLC and make notes of the purpose of each tool, as well as their strengths and weaknesses</i>	<i>groups to review a real-world scenario Case study then demonstrate the use of requirement gathering techniques to ensure the problem is completely understood</i>
Week 5 Oct. 2- 6	<i>Outline the main activities and techniques used in the Analysis Phase of the SDLC (Continue)</i>	Lesson 6 <i>Tools and techniques used in Software Engineering.</i>	<ul style="list-style-type: none"> ● <i>Define what is meant by CASE tools.</i> ● <i>Describe how CASE tools are used in the software development process</i> ● <i>State TWO disadvantages of using CASE tools in a project</i> ● <i>Analyze a case to design an entity-</i> 	<ul style="list-style-type: none"> ● <i>Data Flow Diagrams</i> ● <i>Entity Relationship Diagrams</i> ● <i>Object Models</i> ● <i>Computer Aided Software Engineering (CASE) Tools</i> 	<ul style="list-style-type: none"> ● Collative learning ● Active learning ● Authentic learning ● Demonstration ● Problem solving 	Homework/ Assessment: <i>Draw a Level 1 data flow diagram based on the description of the system requirements given in the class activity case study</i>	In class activity: <i>Students will review a real-world scenario for a business software requirement then design an entity-relationship diagram showing how</i>

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			<p>relationship (ER) diagram to illustrate how, given data could be modeled</p> <ul style="list-style-type: none"> ● Draw a Level 1 data flow diagram based on the description of a given system 				<i>the data could be modeled</i>
<p>Week 6 Oct. 9-13</p>	<p><i>Outline the main activities and deliverables of the design phase</i></p>	<p>Lesson 7 <i>Activities in the Design Process</i></p>	<ul style="list-style-type: none"> ● <i>Explain design processes architectural design, interface design, data structure design, algorithm design.'</i> ● <i>Distinguish Between functional and objected oriented design strategies</i> ● <i>Apply relevant tools and techniques to create the deliverables of the design phase</i> ● <i>Evaluate when it is appropriate to use various Design methods</i> 	<ul style="list-style-type: none"> ● <i>Architectural Design</i> ● <i>Data structure Design</i> ● <i>Algorithm Design</i> ● <i>Interface Design</i> 	<ul style="list-style-type: none"> ● <i>Shared Discussion</i> ● <i>Cooperative learning</i> ● <i>Explanation</i> 	<p>Homework/ Assessment:</p> <p><i>Students will be required to research and make notes on the advantages and disadvantages of the design methods.</i></p> <ul style="list-style-type: none"> ● <i>Top-down,</i> ● <i>bottom-up,</i> ● <i>system structuring (sub-systems, modules, programs)</i> 	<p>In class activity:</p> <p><i>Students will participate in a group activity, to research and present on the main activities and deliverables of the design phase.</i></p> <p>Students will include the following Design</p>

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		Lesson 8 <i>Deliverables of the Design Phase</i>	<ul style="list-style-type: none"> ● Describe the deliveries of the design phases. ● Differentiate between the system design and the interface design 	<ul style="list-style-type: none"> ● System Architecture ● Design Specification 	<ul style="list-style-type: none"> ● Shared Discussion ● Cooperative learning ● Explanation 	Homework/ Assessment: Students will review reports and user interfaces then critique them. Students will focus on the appropriate use of font type, size, colors, spacing, labeling or instructions, useability	In class activity: Students will be required to explore content in small groups to engage peers in shared discussions to gain clarity, then complete an activity sheet.

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		<p>Lesson 9 <i>Interface Design</i></p>	<ul style="list-style-type: none"> ● identify the types of user interfaces ● state the advantages and disadvantage of Graphical and command line user interface ● outline the requirements for screen layouts and reports 	<ul style="list-style-type: none"> ● Guidelines for screens, reports, user interfaces. 	<ul style="list-style-type: none"> ● Buzz group ● Demonstration 	<p>Homework/ Assessment:</p> <p>Students will be required to research and present on the tools used in the SDLC Design Phase.</p> <p>Note: Students will demonstrate the use of the tools during presentation</p>	<p>In class activity:</p> <p>Students will participate in constructing User Interface diagrams using specialized software and or drawings in their notebooks</p>
<p>MID TERM BREAK</p> <p>Date: Oct 16 - 20</p>							
<p>Week 7 Oct. 23-27</p>	<p><i>Outline the main tools and techniques of the design</i></p>	<p>Lesson 10 <i>Tools of the Design Phase</i></p>	<ul style="list-style-type: none"> ● distinguish between the different tools of the design phase 	<ul style="list-style-type: none"> ● Structure Chart ● HIPO Chart ● CASE tools 	<ul style="list-style-type: none"> ● Discussion ● Cooperative learning 	<p>Homework/ Assessment:</p> <p>Research and make notes on one of the</p>	<p>In class activity:</p> <p>Students will</p>

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	<i>phase</i>		<ul style="list-style-type: none"> ● <i>outline the function of each tool in the SDLC Design Phase</i> 		<ul style="list-style-type: none"> ● <i>Activity Based Learning</i> ● <i>Demonstration</i> 	<i>Techniques of the Design Methods Used in the SDLC.</i>	<p><i>Collaborate to Present on how to construct System</i></p> <p><i>Structuring diagrams using specialized software and or drawings in their notebooks.</i></p>
		<p>Lesson 11 <i>Techniques of the Design Methods</i></p>	<ul style="list-style-type: none"> ● <i>Identify the techniques of the SDLC Design Methods</i> ● <i>Outline the characteristics of the various design methods</i> 	<ul style="list-style-type: none"> ● <i>Top-down Approach</i> ● <i>Bottom-up Approach</i> ● <i>System Structuring</i> 	<ul style="list-style-type: none"> ● <i>Cooperative learning</i> ● <i>Project Based Learning</i> ● <i>Demonstration</i> ● <i>Discussions</i> 	<p>Homework/ Assessment:</p> <p><i>Students will participate in creating System</i></p> <p><i>Structuring diagrams using specialized software and or drawings in their notebooks.</i></p>	<p>In class activity:</p> <p><i>Students will review then analyze real-world scenarios and create the appropriate diagrams using specialized</i></p>

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							software.
		Lesson 12 Design Strategies	<ul style="list-style-type: none"> ● Define the terms “Functional Design” and “Object Oriented Design” ● Distinguish between the “Functional Design” and “Object Oriented Design” 	<ul style="list-style-type: none"> ● Functional Design ● Object Oriented Design 	<ul style="list-style-type: none"> ● Discussion ● Cooperative learning ● Explanation 	Homework/ Assessment: Research both the Functional Design and the Object-Oriented Design then report on which allows testing and coding to be done early as well as encourage code reusability	In class activity: In groups of four (4) research the advantages and disadvantages of both “Functional Design” and “Object Oriented Design”, then discuss the findings for clarity
6 WEEK TEST (1ST) October 23- 27							
Week 8 Oct. 30- Nov. 03	Outline the main activities tools techniques and	Lesson 13 Aspects of Software Implementation	<ul style="list-style-type: none"> ● Explain the importance of training end users 	<ul style="list-style-type: none"> ● Coding → Reuse → Configuration 	<ul style="list-style-type: none"> ● Activity Based Learning 	Homework/ Assessment: Standardized test	In class activity: Students will conduct

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	<i>deliverables of the Implementation phase</i>			<p style="text-align: center;"><i>Management</i></p> <p style="text-align: center;">→ <i>Host-Target Development</i></p> <ul style="list-style-type: none"> ● <i>Product Installation and release</i> ● <i>Training of end users on the</i> 			<i>research, exploring and have discussions in small groups content on the following aspects of Software Implementation in the SDLC:</i>
Week 9 Nov. 6-10	<i>Outline the main activities tools techniques and deliverables of the Validation Phase</i>	Lesson 14 <i>The need for Testing</i>	<ul style="list-style-type: none"> ● <i>Describe the various methods of software testing.</i> ● <i>State the importance of testing in the SDLC.</i> ● <i>Distinguish between unit testing and acceptance testing.</i> ● <i>Outline the deliverables of the Validation Phase.</i> 	<ul style="list-style-type: none"> ● <i>Test plans,</i> ● <i>software inspection</i> ● <i>software testing (white box & black box testing)</i> ● <i>unit inspection,</i> ● <i>acceptance test</i> ● <i>test case design</i> 	<ul style="list-style-type: none"> ● <i>Cooperative learning</i> ● <i>Discussions</i> ● <i>Think-Pair-Square-Share</i> 	Homework/ Assessment: <i>Students will be given a quiz to complete</i>	In class activity: <i>Students will be Engages in explorative learning where they will explore the lesson content in small groups and have shared</i>

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							discussions to gain clarity.
	Outline the main activities tools techniques and deliverables of the Evolution phase	Lesson 15 Software Evolution	<ul style="list-style-type: none"> ● Describe the activities done at the Evolution phase ● Outline the deliverables of the Validation Phase. ● Explain the importance of the Evolution phase in the SDLC 	<ul style="list-style-type: none"> ● Software Stages ● Change Identification & Evolution ● Change Implementation ● Lehman's Laws 	<ul style="list-style-type: none"> ● Cooperative learning ● Discussions ● Think-Pair-Square-Share 	Homework/ Assessment: Students will be given a quiz to complete	In class activity: Students will be Engages in explorative learning where they will explore the activities tools techniques and deliverables of the Evolution phase in small groups and have shared discussions to gain clarity and male notes based on their understanding.
Week 10	Describe the concept of	Lesson 16	● State the fundamental characteristics of	● Stacks,	● Demonstration	Homework/ Assessment:	In class activity:

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Nov. 13-17	abstract data types (ADTs)	Overview of ADTs	<p>abstract data types (ADTs)</p> <ul style="list-style-type: none"> ● Describe the concepts of Data linear and non-linear structures ● Distinguish between primitive and non-primitive ADTs ● Explain how to initialize, add, remove and find an element of the ADTs data structure 	<ul style="list-style-type: none"> ● Queues, ● Singly Linked List 	<ul style="list-style-type: none"> ● Discussions ● Think-Pair-Square-Share 	Students will review and analyze real-world scenarios to illustrate the application of ADTs.	Students will participate in a group activity, to research and have shared discussions present on the concept of abstract data types (ADTs)
	Distinguish among ADTs	Lesson 17 Definition, Structure and Operation of ADTs	<ul style="list-style-type: none"> ● Define the terms Data Structure ● State the operation that can be performed on each ADTs ● Distinguish between ADTs based on their operations 	<p>ADTs Data structures:</p> <ul style="list-style-type: none"> ● Linear ● Non-linear <p>Operations performed on:</p> <ul style="list-style-type: none"> ● Linked List ● Stacks ● Queues 	<ul style="list-style-type: none"> ● Discussion ● Buzz groups ● Explanation 	Homework/ Assessment: Illustrate the basic Linked Lists ADTs operations using a flow chart diagram	In class activity: Students will complete assessment as an activity sheet comprising of CAPE past paper questions
	Perform basic	Lesson 18	<ul style="list-style-type: none"> ● Use diagrams and 	<ul style="list-style-type: none"> ● Linked List 	<ul style="list-style-type: none"> ● Discussion 	Homework/	In class

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	<i>operations on Standard ADTs using diagrams and algorithms</i>	Operations of Linked Lists, Stack & Queues	<i>algorithm to perform basic operations on standard ADTs</i>	Operations; → Insert in Front → Insert at Back → Delete from Front → Delete from Back ● Stacks Operations: Push, Pop, Empty, Full ● Queues Operations: Enqueue, Dequeue	● Cooperative learning ● Demonstrations ● Activity based learning	Assessment: Write C code for the Stacks operations (Push and Pop) as well as the Queues operations (Enqueue and Dequeue) ADTs.	activity: Write an algorithm for Perform basic operations on Linked Lists ADTs.
Week 11 Nov. 20-24	<i>Implement basic ADTs</i>	Lesson 19 <i>Operations of Linked Lists</i>	● Identify the operations of Linked Lists ADTs ● Explain the process of how to implement Linked List Operations. ● Create C program to perform Operations on Linked Lists ADTs	● Linked List Operations → Insert in Front → Insert at Back → Delete from Front → Delete from Back	● Cooperative learning ● Demonstrations ● Project based Learning	Homework/Assessment: Write C code for the Operations of Linked Lists operations (Delete from front and from back)	In class activity: Write C code for the Operations of Linked Lists operations (insert in front and at back)
	<i>Implement basic ADTs using one-dimensional arrays</i>	Lesson 20 <i>Operations of Stacks</i>	● Create C program to implement Linked Lists ADTs operations using one-dimensional arrays	● Stack Operations: → Push → Pop	● Cooperative learning ● Demonstrations ● Project based	Homework/Assessment: Each student will write and execute C	In class activity: In small groups of four (4) Write C program to

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				→ <i>IsEmpty</i> → <i>IsFull</i>	Learning	<i>programs using a C compiler to implement the Stacks Operations of (IsEmpty and IsFull)</i>	<i>implement the Stacks Operations of (Push and Pop)</i>
Week 12 Nov. 27- Dec. 01	Practical: <i>Implement basic ADTs using one-dimensional arrays</i>	Lesson 21 <i>Operations of Queues</i>	<ul style="list-style-type: none"> ● <i>Outline the steps to perform basic Operations of Queues ADTs</i> ● <i>Write a C program to Implement basic Operations of Queues using one-dimensional arrays</i> 	<ul style="list-style-type: none"> ● <i>Queues Operations:</i> → <i>Push</i> → <i>Pop</i> → <i>IsEmpty</i> → <i>IsFull</i> 	<ul style="list-style-type: none"> ● <i>Cooperative learning</i> ● <i>Demonstrations</i> ● <i>Project based Learning</i> 	Homework/ Assessment: <i>Each student will write & execute C code in a compiler to perform basic Operations of IsEmpty and IsFull on Queues ADTs using one-dimensional arrays</i>	In class activity: <i>Each student will write & execute C code in a compiler to perform basic Operations of Push and Pop on Queues ADTs using one-dimensional arrays</i>
	Theory: <i>Describe searching and sorting algorithms using one-</i>	Lesson 22 <i>Searching Algorithms</i>	<ul style="list-style-type: none"> ● <i>Explain the function of the Linear and Binary search techniques</i> ● <i>Describe how binary and Linear search techniques would</i> 	<ul style="list-style-type: none"> ● <i>Linear search</i> ● <i>Binary Search</i> 	<ul style="list-style-type: none"> ● <i>Discussion</i> ● <i>Presentation</i> ● <i>Cooperative learning</i> ● <i>Activity based</i> 	Homework/ Assessment: <i>Explain the function of the Linear and Binary search techniques:</i>	In class activity: <i>Research searching and sorting algorithms</i>

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	<i>dimensional arrays</i>		search an array for data ● Distinguish between binary and Linear search algorithm		<i>learning</i>		<i>using one-dimensional arrays, then present findings to class.</i>
	Practical: <i>Implement searching and sorting algorithms</i>	Lesson 23 Searching Algorithms	● Explain the process of how linear search access data in an array ● Outline the steps to Implement searching and sorting algorithms ● Use binary search and linear search to access data in an array	● Linear search ● Binary Search	● Cooperative learning ● Discussion ● Project based Learning ● Explanation	Homework/ Assessment: <i>In groups of four (4) students will write a Linear searching algorithm to store and then sort the values in an array.</i> <i>Students will present on the code in the class.</i>	In class activity: <i>Individually student will write a binary searching algorithm to store and then sort the values in an array</i>
6 WEEK TEST (2nd)							
December 04 - 08							
Week 13 Dec. 11-	Theory: <i>Describe</i>	<i>Sorting Algorithms</i>	● Explain the function of the Selection and Bubble sorting	● Selection Sort ● Bubble Sort	● Discussion ● Cooperative	Homework/ Assessment:	In class activity:

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15	<i>searching and sorting algorithms using one-dimensional arrays</i>		techniques <ul style="list-style-type: none"> ● Describe how Selection and Bubble sorting techniques would sort data in an array from smallest to largest. 		<i>learning</i> <ul style="list-style-type: none"> ● Demonstrations 	Write C program to sort the values in the array from the class activity using selection and bubble	<i>Presentation on the searching algorithms homework from the previous class.</i>
	Practical: Implement searching and sorting algorithms	Sorting Algorithms	<ul style="list-style-type: none"> ● Explain the process of how Selection and Bubble sorting techniques sort data in an array ● Outline the steps to Implement Selection and Bubble sorting techniques ● Use Selection and Bubble sorting techniques to sort data in an array 	<ul style="list-style-type: none"> ● Selection Sort ● Bubble Sort 	<ul style="list-style-type: none"> ● Discussion ● Cooperative learning ● Demonstrations 	Homework/ Assessment: Write C program to sort the values in the array from the class activity using simple bubble sort	In class activity: Each student will write & execute C code in a compiler to store and then sort the values in an array using simple selection sort