



FACULTY OF SCIENCE

ACADEMY OF COMPUTER SCIENCE AND SOFTWARE ENGINEERING

MODULE **IFM01A1 & IFM1A10**
INTRODUCTION TO ALGORITHM DEVELOPMENT (VB)

CAMPUS APK

EXAMINATION SSA JULY 2016 (PAPER C)

DATE	July 2016	SESSION	-
ASSESSORS		MR M CILLIERS DR WS LEUNG	
INTERNAL MODERATOR		MR D COTTERRELL	
DURATION	180 Minutes	MARKS	100

INSTRUCTIONS

- ☞ This question paper comprises 3 (three) pages (including this cover page)
- ☞ The first 20 (twenty) minutes are reserved for DESIGN
- ☞ Answer ALL questions (a-g)
- ☞ The marksheet on page 3 (three) forms part of the question
- ☞ No further marks will be awarded for Correct Execution from the point your submitted program terminates unexpectedly

- ☞ Project naming convention: SXXX_YYYYYYYYY where X represents your computer number and Y represents your student number (e.g. student 201600001 sitting at computer number 10 will name their project S010_201600001)
- ☞ SAVE REGULARLY - no additional time will be granted due to power failures
- ☞ Save ONLY to the T:\ directory
- ☞ Do NOT save to other locations outside of the default project folder - use ONLY the Save All button

- ☞ When you are ready to submit: read through page 3 for submission guidelines and complete your details
- ☞ An invigilator must be alerted to verify and take in your submission

**DO NOT TURN OVER THIS QUESTION PAPER UNTIL YOU HAVE
BEEN GIVEN INSTRUCTION TO**



The Nautical Research Institute is proud to unveil Shippy McShipShip, the latest research sea vessel to be launched off to explore the wonders of our planet's sea life. They have approached you to design and develop a Visual Basic application to assist with record-keeping. Your solution must reflect good programming practices as taught to you in the course of this module (decent UI design, modularity, commented code, etc.). Where **Double** values must be displayed, use the **Format** command to limit values to 2 decimal places.

- a) The application will need to store the following data about each Day in the form of records:

Field	Example Data
1. Day Number	1
2. Chief researcher	"Captain McBoatFace"
3. The following data for each Entry recorded on the Day:	
i. Reading on the Research-o-meter each hour	120.58, 87.56, ..., 210
ii. Average Research-o-meter value	See Question d
4. Index of Entry with highest average Research-o-meter value	See Question e
5. Research value	See Question f

- b) Users of the application must be able to specify any number of Days, any number of Entries per Day, and any number of Hours per Entry. You may assume that:
- Each Day will have the same number of Entries; and
 - Each Entry will be monitored for the same number of Hours.
- c) Ask the user to input the necessary data for each Day (and its Entries) into records.
- d) For each Entry recorded on each Day, calculate, store (in field 3ii), and display the average Research-o-meter value.
- e) For each Day, calculate, store (in field 4), and display the index of the Entry with the highest average Research-o-meter value.
- f) For each Day, calculate, store (in field 5), and display its Research value. This value is calculated by considering the Day's highest Average Research-o-meter (field 3ii), as well as the Index of the Entry with the highest average Research-o-meter (field 4) in the following manner:

When Index (field 4) Is...	Research value is...
Even	Average Research-o-meter reading / 10
Odd	Average Research-o-meter reading / 15

Calculating each of the Research values should be done with a subroutine called **CalcRV** that accepts a **Double** variable **Ave**, an **Integer** variable **Index**, and returns the answer in the form of another **Double** variable. In addition, a **Select Case** statement must be used inside **CalcRV**.

- g) The Nautical Research Institute would like to know if research is improving as each day passes. This is determined by evaluating the Research value of each Day (field 5) to see if the values are increasing. Determine and display the answer in a separate textbox control.

**COMPUTER NUMBER
CARD**

Student Number:

Surname, Inits /
Passport / ID:

Submission Checklist (check the blocks that apply):

- I have followed the naming convention as instructed on page 1 ☐
- I have set the **DebugState** of the UJGrid control to **False** ☐
- A zip of the full and final project has been uploaded to Eve ☐
- A backup zip of the full and final project has been:
 - Burnt to CD ☐
 - Saved to USB by my invigilator ☐

or

I further acknowledge that:

- I know that a non-compiling submission is capped at 40%
- I take full responsibility for ensuring that my submission is correct and the version I intend to submit for assessment

Signature:

Invigilator's initials:

Mark Allocation
Total

0.1	Design (Input, Output, Events & Actions, Variables, Record structures, Interface, Algorithms)	5
0.2	Implementation of Interface	2
0.3	Option Statements	1
0.4	Effective use of subroutines	1
0.5	Commenting	1
A.1	Definition of Entry record structure	3
A.2	Definition of Day record structure	6
B.1	Input of number of Days, Entries, and Hours	2
B.2	Set up of dynamic arrays	5
B.3	Set up of UJGrid control, DebugState of UJGrid set to False	2
B.4	Labelling of UJGrid control headings (Days as Rows, and Entries as Columns)	3
C.1	Input of data for each Day (including data on each Entry)	5
D.1	Calculation of Average Research-o-meter per Entry per Day	5
D.2	Display of Average Research-o-meter per Entry per Day	2
D.3	Correct	7
E.1	Calculation of Index of Highest Average Research-o-meter per Day	6
E.2	Display of Index of Highest Average Research-o-meter per Day	1
E.3	Correct	7
F.1	CalcRV Function (includes Select Case)	4
F.2	Use of CalcRV subroutine in calculation of Research value per Day	3
F.3	Display of Research value per Day	1
F.4	Correct	8
G.1	Determination of Increasing Trend in Research values	9
G.2	Display of Increasing Trend in Research values	1
G.3	Correct	10
Total		100