



Resources to support the Higher Computing Science course

The following table shows which past examination paper questions would be suitable for the revised Higher course.

Software design and development		
Course specification		Past Paper Questions
Development methodologies	Describe and compare the development methodologies: <ul style="list-style-type: none"> ◆ iterative development process ◆ agile methodologies 	2014 spec paper Q5(b) 2015 Q8 (with slight alteration)
Analysis	Identify the: <ul style="list-style-type: none"> ◆ purpose ◆ scope ◆ boundaries ◆ functional requirements of a problem that relates to the design and implementation at this level, in terms of: <ul style="list-style-type: none"> ◆ inputs ◆ processes ◆ outputs 	
Design	Identify the data types and structures required for a problem that relates to the implementation at this level. Read and understand designs of solutions to problems at this level, using the following design techniques: <ul style="list-style-type: none"> ◆ structure diagrams ◆ pseudocode 	

	<p>Exemplify and implement efficient design solutions to a problem, using a recognised design technique, showing:</p> <ul style="list-style-type: none"> ◆ top level design ◆ the data flow ◆ refinements <p>Describe, exemplify, and implement user-interface design, in terms of input and output, using a wireframe.</p>	
Implementation (data types and structures)	<p>Describe, exemplify and implement appropriately the following structures:</p> <ul style="list-style-type: none"> ◆ parallel 1-D arrays ◆ records ◆ arrays of records 	<p>2015 Q7(a) 2016 Q15(a) 2017 Q9(a) 2018 Q12(b)(i)(ii)</p>
Implementation (computational constructs)	<p>Describe, exemplify, and implement the appropriate constructs in a procedural high-level (textual) language:</p> <ul style="list-style-type: none"> ◆ parameter passing (formal and actual) ◆ the scope of local and global variables ◆ sub-programs/routines, defined by their name and arguments (inputs and outputs): <ul style="list-style-type: none"> — functions — procedures ◆ pre-defined functions (with parameters): <ul style="list-style-type: none"> — to create substrings — to convert from character to ASCII and vice versa — to convert floating-point numbers to integers — modulus ◆ file handling <ul style="list-style-type: none"> — sequential CSV and txt files (open, create, read, write, close) 	<p>2014 spec paper Q9(c) 2014 spec paper Q10(b) 2015 Q4(b) 2015 Q14(c) 2016 Q10(a) 2016 Q10(b) 2016 Q10(d) 2016 Q15(b) 2016 Q15(d) 2017 Q9(b) 2017 Q10(d) 2017 Q12(a) 2017 Q12(b) 2017 Q12(d) 2018 Q15(b),(c),(f)</p>

	Read and explain code that makes use of the above constructs.	
Implementation (algorithm specification)	<p>Describe, exemplify, and implement standard algorithms using 1D arrays or arrays of records:</p> <ul style="list-style-type: none"> ◆ linear search ◆ find minimum and maximum ◆ count occurrences 	<p>2014 spec paper Q10(a) 2015 Q3 2015 Q7 2015 Q17(b) 2016 Q15(c) 2017 Q10(a) 2018 Q7 2018 Q12(c) 2018 Q15(a)</p>
Testing	<p>Describe, exemplify and implement a comprehensive final test plan to show that the functional requirements are met.</p> <p>Identify syntax, execution, and logic errors at this level.</p> <p>Describe and exemplify de-bugging techniques:</p> <ul style="list-style-type: none"> ◆ dry runs ◆ trace tables/tools ◆ breakpoints ◆ watchpoints 	<p>2014 spec paper Q8(b)(i) 2015 Q17(c) 2015 Q17(d) 2016 Q13(a) 2016 Q15(e) 2017 Q10(c) 2017 Q12(c) 2018 Q15(d),(e)</p>
Evaluation	<p>Describe, identify, and exemplify the evaluation of a solution in terms of:</p> <ul style="list-style-type: none"> ◆ fitness for purpose ◆ efficient use of coding constructs ◆ usability ◆ maintainability ◆ robustness 	<p>2017 Q19(c)(2) 2016 Q2(1) 2016 Q21(d)(1) 2015 Q9(2) 2014 Q20(b)(1) 2013 SP Q14(2)</p>

Computer systems		
Course specification		Past Paper Questions
Data representation	<p>Describe and exemplify the use of binary to represent positive and negative integers using two's complement, including the range of numbers that can be represented using a fixed number of bits.</p> <p>Conversion of two's complement numbers from binary to denary and vice versa.</p> <p>Describe and exemplify floating point representation of positive and negative real numbers, using the terms mantissa and exponent.</p> <p>Describe the relationship between the number of bits assigned to the mantissa/exponent, and the range and precision of floating-point numbers.</p> <p>Describe Unicode used to represent characters and its advantage over extended ASCII code (8-bit) in terms of numbers of characters.</p> <p>Describe the relative advantages and disadvantages of bit-mapped graphics versus vector graphics.</p>	<p>2014 spec paper Q6</p> <p>2015 Q15(c)(ii)</p> <p>2016 Q1</p> <p>2017 Q1</p> <p>2017 Q14(b)</p> <p>2018 Q1</p> <p>2018 Q5</p> <p>2018 Q11(d)(i)</p>
Computer structure	<p>Describe the concept of the fetch-execute cycle</p> <p>Describe the factors affecting computer system performance:</p> <ul style="list-style-type: none"> ◆ number of processors (cores) ◆ width of data bus ◆ cache memory ◆ clock speed 	<p>2015 Q9</p> <p>2015 Q13(a)</p> <p>2016 Q13(c)</p> <p>2017 Q15(a)</p> <p>2017 Q15(b)</p> <p>2018 Q8</p> <p>2018 Q9</p>

<p>Environmental impact</p>	<p>Describe the environmental impact of intelligent systems:</p> <ul style="list-style-type: none"> ◆ heating systems ◆ traffic control ◆ car management systems 	<p>2017 Q10(e)</p>
<p>Security risks and precautions</p>	<p>Describe and identify the implications for individuals and businesses of the Computer Misuse Act 1990:</p> <ul style="list-style-type: none"> ◆ unauthorised access to computer material ◆ unauthorised access with intent to commit a further offence ◆ unauthorised modification of programs or data on a computer <p>Describe and identify the security risks:</p> <ul style="list-style-type: none"> ◆ tracking cookies ◆ DOS (Denial of Service) attacks: <ul style="list-style-type: none"> — symptoms <ul style="list-style-type: none"> ○ slow performance, inability to access — effects <ul style="list-style-type: none"> ○ disruption to users and business — costs <ul style="list-style-type: none"> ○ lost revenue, labour in rectifying fault — type of fault <ul style="list-style-type: none"> ○ bandwidth consumption, resource starvation, Domain Name Service(DNS) — reasons <ul style="list-style-type: none"> ○ financial, political, personal <p>Describe how encryption is used to secure transmission of data:</p> <ul style="list-style-type: none"> ◆ use of public and private keys ◆ digital certificates ◆ digital signatures 	<p>2015 Q13(d) 2016 Q11(e) 2017 Q5 2017 Q6 2018 Q2</p>

Database design and development		
Course specification		Past Paper Questions
Analysis	Identify the end-user and functional requirements of a database problem that relates to the implementation at this level.	
Design	<p>Describe and exemplify entity-relationship diagrams with three or more entities, indicating:</p> <ul style="list-style-type: none"> ◆ entity name ◆ attributes ◆ name of relationship ◆ cardinality of relationship (one-to-one, one-to-many, many-to-many) <p>Describe and exemplify an instance using an entity-occurrence diagram.</p> <p>Describe and exemplify a compound key.</p> <p>Describe and exemplify a data dictionary with three or more entities:</p> <ul style="list-style-type: none"> ◆ entity name ◆ attribute name ◆ primary and foreign key ◆ attribute type: <ul style="list-style-type: none"> — text — number — date — time — Boolean ◆ attribute size ◆ validation: <ul style="list-style-type: none"> — presence check — restricted choice — field length — range 	<p>2015 Q2 2015 Q11 2015 Q12(a) 2015 Q12(b) 2015 Q12(c) 2016 Q7(a) 2016 Q7(b) 2016 Q14(c) 2017 Q11(a) 2017 Q11(b)(i) 2018 Q14(a),(b),(d)</p>

	<p>Exemplify a design of a solution to a query:</p> <ul style="list-style-type: none"> ◆ tables and queries ◆ fields ◆ search criteria ◆ sort order ◆ calculations ◆ grouping 	
Implementation	<p>Describe, exemplify and use SQL operations for pre-populated relational databases, with three or more linked tables:</p> <ul style="list-style-type: none"> ◆ UPDATE, SELECT, DELETE, INSERT statements making use of: <ul style="list-style-type: none"> — wildcards — aggregate functions (MIN, MAX, AVG, SUM, COUNT) — computed values, alias — GROUP BY — ORDER BY — WHERE <p>Read and explain code that makes use of the above SQL.</p>	
Testing	<p>Describe and exemplify testing:</p> <ul style="list-style-type: none"> ◆ SQL operations work correctly at this level 	
Evaluation	<p>Evaluate solution in terms of:</p> <ul style="list-style-type: none"> ◆ fitness for purpose ◆ accuracy of output 	

Web design and development		
Course specification		Past Paper Questions
Analysis	Identify the end-user and functional requirements of a website problem that relates to the design and implementation at this level.	
Design	<p>Describe and exemplify the website structure of a multi-level website with a home page and two additional levels, with no more than four pages per level.</p> <p>Describe, exemplify and implement, taking into account end-user requirements and device type, an effective user-interface design (visual layout and readability) using wire-framing:</p> <ul style="list-style-type: none"> ◆ horizontal navigational bar ◆ relative horizontal and vertical positioning of the media ◆ form inputs ◆ file formats of the media (text, graphics, video, and audio) <p>Describe, exemplify and implement prototyping (low fidelity) from wireframe design at this level.</p>	2016 Q11(a)
Implementation (CSS)	<p>Describe, exemplify and implement efficient inline, internal and external Cascading Style Sheets (CSS) using grouping and descendant selectors to:</p> <ul style="list-style-type: none"> ◆ control appearance and positioning: <ul style="list-style-type: none"> — display (block, inline, none) — float (left, right) — clear (both) — margins/padding — sizes (height, width) ◆ create horizontal navigation bars: 	2018 Q13(b)

	<ul style="list-style-type: none"> — list-style-type:none — hover <p>Read and explain code that makes use of the above CSS</p> <p>Read and explain code that makes use of the above CSS.</p>	
Implementation (HTML)	<p>Describe, exemplify and implement HTML code:</p> <ul style="list-style-type: none"> ◆ nav ◆ header ◆ footer ◆ section ◆ main ◆ form ◆ id attribute <p>Describe, exemplify and implement form elements:</p> <ul style="list-style-type: none"> ◆ form element: input <ul style="list-style-type: none"> — text — number — textarea — radio — submit ◆ form element: select <p>Describe, exemplify and implement form data validation:</p> <ul style="list-style-type: none"> ◆ length ◆ presence ◆ range <p>Read and explain code that makes use of the above HTML.</p>	
Implementation (JavaScript)	Describe, exemplify and implement coding of JavaScript functions related to mouse events:	2017 Q11(c) 2018 Q13(c)

	<ul style="list-style-type: none"> ◆ onmouseover ◆ onmouseout ◆ onclick 	
Testing	<p>Describe, exemplify and implement usability testing using personas, test cases and scenarios based on low fidelity prototypes.</p> <p>Describe and exemplify testing:</p> <ul style="list-style-type: none"> ◆ input validation ◆ navigational bar works ◆ media content displays correctly <p>Description and exemplification of compatibility testing including:</p> <ul style="list-style-type: none"> ◆ device type: <ul style="list-style-type: none"> — tablet, smart phone, desktop ◆ compatibility with the operating system and browser 	<p>2015 Q10</p> <p>2017 Q13(a)</p>
Evaluation	<p>Evaluate solution at this level in terms of</p> <ul style="list-style-type: none"> ◆ fitness for purpose ◆ usability 	