

*Research and Information Services*

**MONITORING STANDARDS REPORT**



# **Comparison of Computing Studies Higher 1992,1998 and Computing Higher 2004**

# Findings

## 1 Syllabus

### 1.1 General approach

There are now more opportunities for practical, real-world applications and opportunities to investigate modern technologies. The whole syllabus is more modern and, therefore, up-to-date. There is a shift from rote learning to higher-order processing, ie thinking, analysis and decision making. There is more emphasis on the Software Development Lifecycle across the syllabus. Within the Artificial Intelligence option there is also more higher-order thinking required.

#### 1.2.1 Elements added to the more recent syllabus

In Computer Systems the two-state machine, utility software, compiler, interpreter, types of programming languages, types of applications, the whole of outcomes 3 and 4 (input, storage and output and analysis of requirements) is new.

In Software Development there is more emphasis on the stages of the software development life-cycle, especially the processes within analysis. Documentation and design processes are more explicit than they were before.

In AI, although history was always taught it is now more explicit. The same is true of analysis, design and searching. The philosophical, moral and ethical issues are new.

In the networking option there are more new topics, as one would expect from a rapidly changing field. Internetworking, intranet, peer-to-peer and client-server are all new as is netiquette and collision detection such as CSMA/CD. A Multimedia option has been added in the 2004 syllabus to reflect the significant application of multimedia technology in the world around us.

#### 1.2.2 Elements missing from the more recent syllabus

DMA, memory mapped I/O vs isolated I/O, and lower-order OS routines in application software, online information service, encode/ decode and multiplexing are all removed.

#### 1.2.3 Have any parts in the syllabus changed?

Many topics have moved from one unit to another: organisation, cabling, processor capacity, parity etc are all moved to the networking option; sequential files, binary searching and sorting have been moved to the programming unit. The depth of treatment of some topics has been changed, and some are mentioned in the support notes without being explicit in the unit descriptors. These include program design aspects, programming primitives, practical aspects of AI and fuzzy logic. There is

more emphasis in general on practical applications and in the higher order processes required from a student.

#### **1.2.4 Has this made the syllabus more or less demanding?**

The traditional themes are much more explicit now in the units. Adding the Software Development Lifecycle has ensured that students analyse their subject before attempting practical elements. However, the unitised approach with end-of-unit assessments has fragmented the course, and there is a concern that compartmentalisation has reduced the cognitive connection between the separate units. It appears that the Knowledge and Understanding has been reduced but the Problem Solving aspects have been increased, making it a more practical and relevant course.

There is generally more breadth but less depth in the course, but there is more emphasis on analytical skills and therefore higher-order processing. The course is less demanding on knowledge understanding. The treatment of information has changed but the course is more clearly defined allowing teachers to better understand what is expected of them. The course is generally more relevant and therefore less abstract. The emphasis on problem solving and analytical skills implies that the syllabus is more demanding of the average student.

#### **1.3.1. Depth of coverage**

Some depth of topic coverage has gone because the technology has changed and the knowledge is now obsolete or subsumed. The topics are more contextualised and this can be exemplified by those questions on the more technical parts of the Computer Systems topic. Questions on this area have less relevance in modern Computing as many of the mechanisms are now user-transparent and, in some cases, are now completely obsolete. The criticism that the depth has gone from some areas, to be replaced with other material only reflects the changing focus of both the syllabus and the exam.

#### **1.3.2 Breadth of coverage**

More areas are covered in the syllabus now, in line with the advances in technology.

## **2 Assessment instrument (1992 1998 and 2004)**

### **2.1 Question Papers**

There is a fundamental change in the structure of the paper: Section I of the newer paper maps onto Paper I of the older papers and covers more Knowledge Understanding questions. There is generally more Problem Solving in the 2004 paper, sections II and III, than in the older papers. The language of the questioning is much improved and there are more of the smaller mark questions which give

better guidance to the depth of treatment and focus of answer required by the candidate.

The balance of questions in the later years has shifted away from “state/name/describe the stages” and towards the “explain/compare” type of question described as Problem solving under Bloom’s taxonomy. There is also a trend towards contextualisation of questions within “real-world” scenarios. This increases the PS element considerably.

In 1992 and 1998, the coursework mark was simply added to the mark gained in the examination papers. In 2004, the coursework and assessment tests had to be passed at 55% before entry was gained to the examination. There are now at least three pieces of coursework for each unit and the burden of assessment is therefore greater on the candidates and teachers.

The papers themselves are different in style; the 2004 paper has more of the smaller mark questions and the language is terse and easy to understand. However, there is a more complicated rubric than in the previous papers. In the 2004 paper there is a clear distinction between Knowledge Understanding and Problem Solving questions. There was no such distinction in the older questions and also no thread of questioning within larger mark questions.

There was a lot of assumed knowledge in the older papers, which would not be assumed now. It was also possible for a candidate to pass the older papers without any effort in an option. However, this would be impossible now as only 49% of the examination is core topic as opposed to 52.5% in the old. There is therefore a broader assessment in the newer examination and candidates should know better what is expected of them. There is a greater probability that set fields will be examined as opposed to the past papers where questions were sampled from a wider field. There was some deliberate overlap in topics between the first and second papers in the older examinations, but setters were instructed to avoid similarity between questions.

## **2.2 Duplication of papers, sections or types from older Papers**

There are no common questions but there are a few common styles. The questions are now much more contextualised, and there is more integration of questions within the paper scheme. There are similar questions in Artificial Intelligence (query trace in expert systems) and, separately, Networking (CSMA/CD) across the three papers studied. There is also some genericity in the Software Development questions such as questions pertaining to system quality attributes such as robustness, correctness, reliability etc. Some topics, such as the old g.p.p. type questions, have moved into the Standard Grade, while the language type questions have shifted into Section II of the newer paper as higher order questions. The depth of treatment is the same. The syllabus has changed radically over the 12 years, in line with the changes in the subject.

### **2.2.1 Do candidates perform similarly on these questions?**

The questions that are similar are only worth a few marks each, and it is statistically naive to make a comparison based on the small sample of candidates over a small sample of optional questions. In the most recent paper there are a large number of small questions sampled from a larger syllabus. Direct statistical comparison is impossible between the examination years.

In the older papers, candidates were expected to write more and had 210 minutes to answer 140 marks worth of questions, which translates as 1% of the overall examination weight every 3 minutes. In 2004, candidates had 100 marks worth of questioning to answer in 150 minutes, answering 1% of examination weight in little over 2 minutes. Therefore there is now less time to answer the same percentage weight of questions, but this should be traded with more focused questioning and shorter answers required. The language in the questions is much improved and less open to confusion. The answer requirements are much more precise and the candidates have a better idea of what is expected of them. There is less chance of a candidate misinterpreting the question and answering incorrectly. The corollary of this is that the answers are much more prescribed and there is less licence for interpretation by the markers. Marks are given for correctly answering the question, not, as perhaps occurred in the past, the ability to decipher what was being asked. It is now presumed that the marks are a truer reflection of the ability of the candidate.

### **2.2.2 Discernable trends**

The level of English used and the legibility of candidates writing was better in the 1992 cohort. It was less so in the 1998 cohort, and the level of English in the 2004 was very basic. There was some evidence of the use of 'text' speak, such as the use of 'U' for 'you'.

## **2.3 Coverage of Question Papers**

The course is more extensive now but, taught at less depth. However, there is a greater probability that set fields will be examined within the sections of the examination paper. In the previous papers the questions did not seem to be coordinated between the fields.

## **2.4 Level of demand**

The modern examination style is fairer on candidates who are not native English speakers. The syllabus is much more grounded now, and there is less linguistic demand on the candidates. The A discriminator questions appeared uncoordinated in the older papers, whereas now they are precisely placed. The older examination papers had more technical and more C level questions than the 2004 paper which was smoother in its treatment of C and A level questions.

The exam is generally fairer but stating that it is more/less demanding depends upon the type of candidate. It appears that the 'average' candidate would experience the same level of challenge in both old and new style exams. The more 'knowledgeable' candidate will be less able to rely on memory skills and rote learning. The 'poorer' candidate will still have difficulty, though they will test themselves against the course, rather than the syntax of the questions.

## **3 Scripts**

### **3.1 A/ B graded scripts**

The content of the newer A candidates' scripts seemed roughly comparable, but their use of English and the legibility of their writing was poor. The pass rates are the same, but the percentage of A candidates is higher now. It is possible that this is because the most movement has come from the B level candidates doing better on the short question and answer modern paper, but more candidate papers would have to be sampled to verify this.

### **3.2 C/D graded scripts**

The newer level C candidates appeared to perform better, possibly because of the change in style of questioning, but their levels of literacy was poor. There were more C level questions in the older papers, so the overall benefit of shorter questions has been damped. An old candidate could possibly pass the newer style examination, given their level of literacy, but it is doubtful that a newer candidate could pass the old. This is of course a general statement given the radical change in content of the syllabus. The modern candidate has poorer linguistic skills but the shorter questions and answers accommodate this problem.

In summary, the modern examination is fairer, with the depth of treatment being maintained in many areas, but with some aspects making way for other topics, more relevant in the context of modern computing. The summative assessment burden is greater throughout all parts of the most recent course.