

First Year Service Course Revision

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Purpose

This document describes a proposed revision to courses offered to students other than those following a major in Computing or IT (C/IT). It stems from a need to revise content to maintain relevance, and to provide an improved study sequence for non-C/IT-majors. The revised courses will be offered from Semester 1, 2004.

The proposal is being circulated to program authorities to give them an opportunity to influence the curriculum and structure, and to determine whether the sequence complements their first year program and could be part of the recommended elective program.

Current Course Structure

The School of Computer Science offers a course sequence appropriate for students pursuing a career in the C/IT field, including Computer Science, Computer Engineering, Software Engineering, Bioinformatics, Electrical Engineering, Telecommunications and Information Systems. The foundation courses for each of these programs are, in order,

COMP1011 Computing 1A or COMP1711 Higher Computing 1A

COMP1021 Computing 1B or COMP1721 Higher Computing 1B

One of the sequences of two courses needs to be completed before the core knowledge objectives are achieved.

For students not proceeding to a C/IT major, the course

COMP1001 Introduction to Computing

was introduced in 1996. Its focus is using applications, exposing students to some of the emerging technologies, and an introduction to programming.

Students wishing to study further in this area move to COMP1011, and then to

COMP2811 Computing B

which is identical to COMP1021, simply rebadged to allow level 2 credit in programs in the Faculties of Science and Arts and Social Science. Very few students now bother to enrol in COMP2811: most naturally assume that COMP1021 follows COMP1011 for everybody. These students may not have followed program rules correctly, and could encounter some difficulties when their potential graduand status is evaluated. The proposed changes eliminate such a possibility.

One other servicing course has been offered in Semester 1:

COMP1091 Computing 1C

was developed specifically for the Mathematics and Finance combined program, and later made available to other BSc/BCom students. Its coverage overlaps with COMP1021 (despite having no formal prerequisite), and it has suffered from attempts to cover the syllabus in too great a depth instead of concentrating on practical skills acquisition. A pass in COMP1091 prepares students reasonably well for progression to level 2 computing courses, though few students currently undertake further studies in this area.

COMP1001 has about 150 enrolments (two-thirds of these in S1) and COMP1091 has just 35 (S1 only). Both could deliver a much improved service through an updated syllabus and better focus on outcomes.

Proposed Course Structure for Non-majors

It is proposed to withdraw COMP1001 and COMP2811 and to introduce a new sequence

COMP1081 Harnessing the Power of Information Technology

COMP1091 Solving Problems with Software and Tools

COMP1081 takes over the role of COMP1001 as an entry point with nil assumed knowledge, and inherits from it a revised and updated syllabus. COMP1091 will also be heavily revised, particularly with respect to outcomes pertinent to non-C/IT majors.

As at present, COMP1091 can be undertaken by students with appropriate competencies without necessarily completing COMP1081 first. Progression to level 2 Computing courses will be possible, though only after completing a self-study articulation module outside the core COMP1091 syllabus.

The new structure is shown below. The sequence for C/IT majors is unchanged.

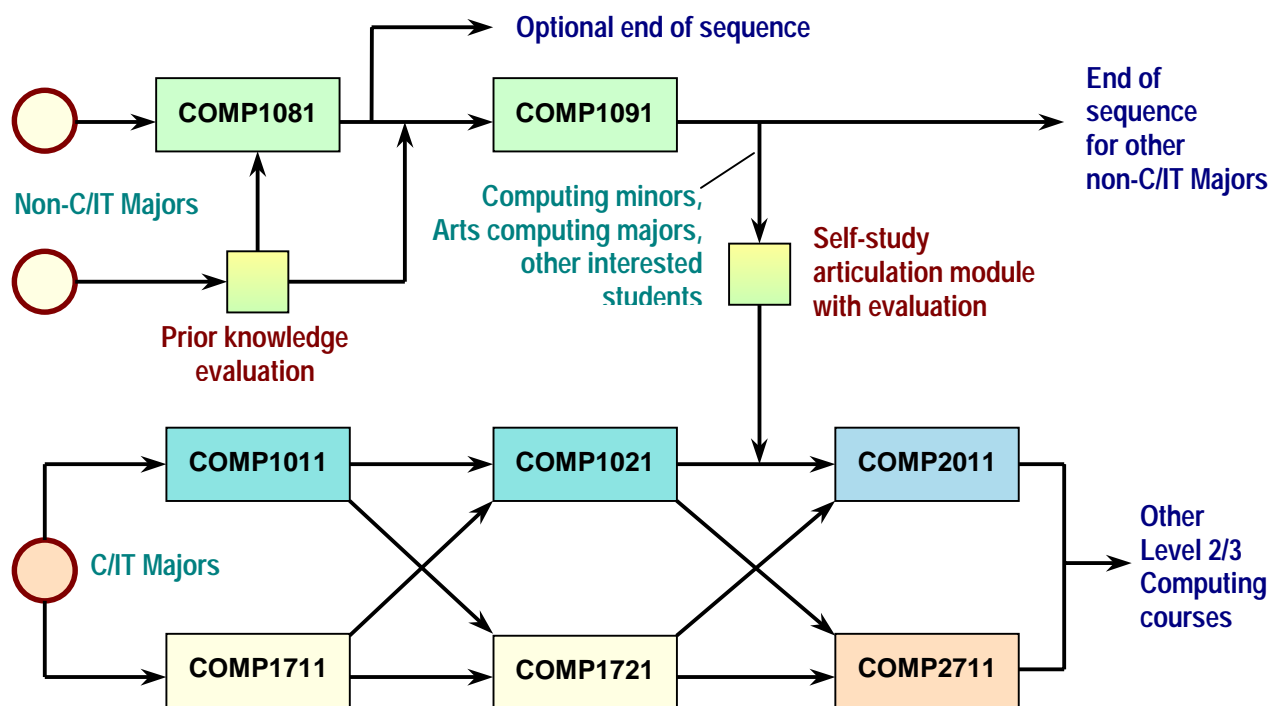


Figure 1. Introductory Computing Courses, 2004

Eligibility and Articulation

Non-C/IT majors who believe they have already acquired comprehensive IT knowledge and skills will be able to self-assess these competencies to determine the most appropriate entry point to the sequence. In general, students with a UAI above 95, or who have achieved a Band 4 result or better in the HSC *Software Design and Development* course, are likely to prefer COMP1091 as their starting point.

It is possible that the present review into the structure of the Electrical Engineering and Telecommunication programs may recommend COMP1091 rather than COMP1011 as the initial course. If this occurs, from S1 2006 it will be necessary to offer a level 2 course that follows on from COMP1091. This course would be based on COMP2011, and be a better way for computing minors to proceed than the self-study module proposed above.

Exit is possible after completing one or two courses, or following articulation to level 2 courses.

Students who have completed COMP1001 or COMP1811 in the past are excluded from COMP1081 but are eligible to undertake COMP1091 from Semester 1, 2004. Students who have recently completed COMP1011 should continue with COMP1021 unless they do not intend undertaking further study in Computing.

Course Objectives

After completing **COMP1081**, students will be able to

- Explain how existing and emerging technologies can be exploited for the benefit of humankind.
- Appreciate how the history of computing and communications led to the present dependence of society on information technologies.
- Understand the importance of data representation and security, networks and the internet in storing, transmitting and safekeeping knowledge.
- Understand how enabling technologies such as computing and communications allow problems in their own discipline to be solved effectively.
- Use common on-line services and business applications to assemble, analyse and present information.
- Explain the concepts behind graphical data representation and image processing.
- Write simple programs to control applications and manage data.

After completing **COMP1091**, students will be able to

- Understand the principles behind software design and implementation.
- Design and implement small-scale programs using the C language.
- Interface to specialised scientific or information processing libraries.
- Understand common data representations, including image formats, and how to construct programs to manipulate them.
- Use Linux software tools to process data in portable formats.
- Write shell scripts that use software tools to process files and data streams.
- Write programs in a scripting language (awk or perl) to solve analysis, reporting and data transformation problems.
- Apply these techniques in their own disciplines.

Syllabus

The following table lists the areas of study covered by either or both courses. Entries indicate the kind of learning outcomes provided.

Area of Study (topic group)	Learning Outcomes	
	COMP1081	COMP1091
History of computing and IT	Describe/understand	
Business and on-line applications	Use	
Image processing applications	Understand/use	Use/control
New and emerging technologies	Describe/understand	
Programming principles	Apply (in a limited way)	Apply (more extensively)
Problem solving through programming	Can do (in a limited way)	Can do (more extensively)
Data and knowledge representation	Describe/understand	Manipulate
Data coding, error detection and security	Describe/understand	Solve problems in
Function libraries and interfaces	Use (VBA only)	Use (C)
Scripting languages		Solve problems using
Application to own discipline	Can do	Can do

Provisional List of Topics: COMP1081

This topic list is subject to review and refinement.

Topic	Weeks	Associated laboratory work?
Introduction, History	1	No
Hardware and software	1-2	Yes: general familiarity
Communications	2-3	Yes: internet
Business application software	3-4	Yes: Microsoft Office
Data representation	5-6	Yes, plus assignment
Image representation and manipulation	6-7	Yes: The Gimp (Photoshop-like GNUware)
Programming principles	8-9	Yes
Visual Basic and VBA	10	Yes
VBA and MS Office applications	11	Yes, plus assignment
Computer security, malware, cryptography	12	No
Emerging technologies: AI, robotics, knowledge based systems	13	Possibly
Emerging technologies: other	14	No

Provisional List of Topics: COMP1091

This topic list is subject to review and refinement. The two streams

C: Building applications using C

T: Using software tools and scripts

Are presented in parallel, although without fixed weekly slots.

Stream C: Building applications

Topic	Weeks	Associated laboratory work?
Software design and development	1-2	Yes: general familiarity with Linux
C Language syntax and semantics	2-4	Yes, plus small assignment
Algorithms and programming techniques	5	Yes
Data representation, image processing	6-7	Yes, plus assignment
Interfacing to libraries	11-12	Possibly

Note on scope: as COMP1091 is not a mainstream computing course, linked structures are not part of the syllabus. Students wishing to articulate to level 2 courses in computing will need to follow a self-study module (under development) prior to commencing these courses. By 2006 it is anticipated that a parallel level 2 computing course will be available allowing direct articulation from COMP1091.

Stream T: Tools and scripting

Topic	Weeks	Associated laboratory work?
Linux/cygwin tools	2	Yes
Shell scripts	4	Yes
Pattern-action programming using awk (or perl)	9-10	Yes
Reporting, analysis and data transformation techniques	10-11	Yes, plus assignment
Scripts for visualisation of data and processes (GIS etc)	13	Yes

Text and Reference books

COMP1081 text TBA. A set of relevant readings will also be available in the library.

COMP1091 text: Davies, P (1995): *The Indispensable Guide to C*. Addison-Wesley.

COMP1091 references: Leek, O'Reilly, Loukides (1997): *Unix Power Tools*, O'Reilly.

Proposed Course Formats

Category	COMP1081	COMP1091
Lectures per week (hours)	2 + 1 demo/review	3
Tutorial per week	no	1 hour
Supervised laboratory per week	2 hours	1.5 hours
Assessment value – labs	10%	5%
Assignments	3	3
Assessment value –assignments	30%	35%
Final written exam	2 hours	2 hours
Final practical exam	no	3 hours
Mid-semester test	no	no
Final exam weighting	60%	60%

Provisional Handbook Descriptions

COMP1081 Harnessing the Power of Information Technology

L3T2

Sessions offered: S1, S2

In the digital age, it is increasingly becoming essential to use, innovatively and effectively, current and emerging information technologies to meet challenges of the new "knowledge economy". Topics include: history of IT, business and on-line applications, data and knowledge representation, coding and security, viruses, worms and other malware, programming principles and techniques. The course will examine latest information technology trends and outline new technologies on the horizon.

COMP1091 Solving Problems with Software and Tools

L3T2.5

Sessions offered: S1, S2

Introduction to building applications and using software tools to solve computing problems. Emphasis is on acquisition of fundamental skills in procedural programming and scripting. Topics include: software design and development, C syntax and semantics, algorithms and programming techniques, data representation, image processing and analysis, interfacing to libraries; Linux tools; command scripts; reporting, data analysis and transformation using a scripting language.