

SCHOOL OF COMPUTING

PROGRAMMES OFFERED BY DEPARTMENT OF COMPUTER SCIENCE SYSTEMS

(Note: This document is for polytechnic students admitted in AY2004-5)

Bachelor of Computing in Communications and Media

Overview

The 4-year **Bachelor of Computing in Communications and Media** aims to train students in the technological underpinnings of internet technologies as well as the required skills of media design and content creation tempered with a proper understanding of the social sciences. Therefore, the programme has been designed to achieve an integrated foundation in all these aspects. Since this programme involves aspects of computing and the arts and social sciences, it can be viewed from two perspectives:

TECHNOLOGY PERSPECTIVE:

- Foundation of IT: This refers to the basics of computing required to understand, design, and extend the internet-based systems.
- Information encoding, information customisation, content-repurposing: Information encoding, such as XML, is required for information to be mass communicated on the Internet and WWW. Customisation refers to the personalisation of information to individuals and groups which the technology allows, and repurposing refers to the customisation of information to the heterogeneous networks (wired and wireless) as well as the plethora of end-devices (static and mobile, with varying display plus communication capabilities).
- Text, multimedia information analysis and processing: These refer to the technological basis of the various digital media (text, image, graphics, audio and video) and the various types of processing, such as data-rate transformation and summarisation.
- Entertainment technology: This refers to technologies required to develop interactive games and virtual reality systems.
- Internet architecture: This refers to the technical aspects of the Internet including networking, client-server architecture, and issues related to scalability, reliability and availability.

CONTENT AND USER PERSPECTIVE:

- Foundation (sociology): This refers to the social science foundation required to contextualise the use of media for communication by individuals and groups in human society.
- Human-computer interaction: This refers to the human-centred design of intuitive and flexible interfaces for people to communicate via the end-devices of the internet fringes.
- Writing and media design for mass communication: This refers to the required arts background, which enables the creative use of digital media for the purpose of expression and communication. The media considered include hypertext, audio, image/graphics, and video.
- Mass communication on the Internet: This refers to the theoretical and empirical principles of mass communications on the WWW.

Degree Requirements

The Communications and Media programme degree requirement is at least 160 modular credits. Modules are classified as follows (note that every module can only be counted towards satisfying exactly one requirement):

(i) **PROGRAMME REQUIREMENTS**

Common Essentials (Total: 26 MCs)

CS1101 or CS1101S	Programming Methodology (5 MCs)
CS1102 or CS1102S	Data Structures and Algorithms (5 MCs)
CS1104	Computer Organization (4 MCs)
CS2102	Database Systems (4 MCs)
CS2103	Software Engineering (4 MCs)
CS2105	Computer Networks I (4 MCs)

Programme Essentials (Total: 53 MCs)

Computer Science Related

CS1231	Discrete Structures (4 MCs)
CS3224	Architecture of Internet (4 MCs)
CS3240	Human-Computer Interaction (4 MCs)
CS3241	Computer Graphics (4 MCs)
CS3242S	Hypermedia Technologies (5 MCs)
CS4101	Honours Project (12 MCs)
CS4102	Technical & Management Training (0 MCs)

Communications and Media (CM) Related ⁺

IF1101E	Information Revolution & Society (4 MCs)
IF2101	Media Communication (4 MCs)
Choose either IF2208 or IF2210	Principles of Visual Communication (4 MCs) Aesthetics of New Media (4 MCs)
IF3209/EL3271	Hypertext and the Electronic Author (4 MCs)
Choose either CS3248 or IF3208	Design of Interactive Media (4 MCs) Designing Content for New Media (4 MCs)

⁺ With approval from the department, students may take a module of equivalent level or higher from Programme Elective Group B in place of a module in Program Essentials.

CM Programme Electives (Total: 24 MCs)

Complete 24 MCs with the following conditions:

- i. At least 8 MCs from the Media & Internet Technology module group;
- ii. At least 8 MCs from the Content Creation & Mass Communications module group;
- iii. At least 16 MCs are at level 4000 or above.

Programmes Elective Groups:

A. Media & Internet Technology module group *

CS3243 Foundation of Artificial Intelligence
CS3248 Design of Interactive Media
CS4213 Games Development
CS4241 Multimedia Information Systems
CS4243 Computer Vision and Pattern Recognition
CS4245 Multimedia E-Learning Environments
CS4247 Image Synthesis and Computer Animation
CS4248 Natural Language Processing
CS4249 Design of Advanced User Interfaces
CS5240 Theory and Practice of Multimedia
CS5246 Text Processing on the Web
Other relevant courses approved by the Department of Computer Science

* Students may choose a module in this group if they have not already taken it as part of Program Essential.

B. Content Creation & Mass Communications module group *

IF2201 Culture & Communications
IF2202 Governance and IT
IF2204 Economics of Information & Communication
IF2207 Internet Studies: Cyber Communications
IF2214 Mass Media & Culture
IF3201 Media, Globalization & IT
IF3206 Knowledge Economies
IF3208 Designing Content for New Media
IF3213/SC3213 Visual Ethnography
IF4201 Culture Industries
IF4202 Transnational Info Producers
IF4204 Ethics in the Information Age
IF4205 Digital Media Project Management
IF4206 Media & Communications Regulation
IF5202 New Media in Emerging Asian Economies
Other relevant courses approved by the Department of Computer Science

* Students may choose a module in this group if they have not already taken it as part of Program Essential.

Science Related (Total: 16 MCs)

MA1505C Mathematics I (4 MCs) or MA1505 Mathematics I (4 MCs)
MA1101R Linear Algebra (4 MCs)
ST2131 Probability (4 MCs)
Science module ¹ (4 MCs)

(ii) *University Level Requirements (Total: 28 MCs)*

As specified in Section 2.1.2.

(iii) *Unrestricted Electives (Total: 13 MCs)*

As specified in Section 2.1.2.

¹ A Science module can be LSM1302 (Genes and Society), LSM1304 (Microbes, Environment and Man), PC1143 (Physics III), PC1144 (Physics IV), PC1221 (Fundamentals of Physics I), PC1222 (Fundamentals of Physics II), or courses approved by the Department of Computer Science

Bachelor of Computing in Computer Science

Overview

The 4-year **Computer Science programme** aims to equip graduates with a strong and broad technical knowledge in computer science and technology. It also provides the flexibility for students to specialise in various fields of computer science. The programme emphasises the four pillars in computer science, viz. *programming languages, computer systems, modelling and algorithms, and human-computer interaction.*

The programme is structured around the U.S. Association of Computing Machinery and the IEEE Computer Society's *Computing Curriculum 2001* recommendations. Students pursuing a degree in B.Comp. (Computer Science) will also pick up knowledge in science, including life science, mathematics, and physics. It inculcates among them an awareness of information technology application across multiple disciplines. It also provides the opportunity for students to receive interdisciplinary education.

Graduates in B.Comp. in CS degree can position themselves in a large number of exciting fields of works, including digital animation, knowledge engineering, software architecture, web design, digital media, and security consultancy.

Degree Requirements

The Computer Science programme degree requirement is at least 160 modular credits. Modules are classified as follows (note that every module can only be counted towards satisfying exactly one requirement):

(i) **PROGRAMME REQUIREMENTS**

a. Common Essentials

CS1101 or CS1101S	Programming Methodology
CS1102 or CS1102S	Data Structures and Algorithms
CS1104	Computer Organisation
CS2102S	Database Systems
CS2103	Software Engineering
CS2105	Computer Networks I

b. Major Requirements Computing Related

CS1231	Discrete Structures
CS2106	Operating Systems
CS3212	Programming Languages
CS3215	Software Engineering Project
CS3230	Design and Analysis of Algorithms
CS4101	Honours Project
CS4102	Technical and Management Training

Minimum of 8 modular credits from the following list of 5 modules:

CS3211	Parallel and Concurrent Programming
CS3220	Computer Architectures
CS3231	Theory of Computation
CS3234	Logic and Formal Systems
CS3243	Foundations of Artificial Intelligence

Complete 16 modular credits from 4000/5000-level modules in elective areas A1 to A4.

Science Related

MA1505C Mathematics I or MA1505 Mathematics I
MA1101R Linear Algebra
ST2131 Probability

A Life-Sciences Module²
A Physics Module³

Others
CS2301

Business and Technical Communication

(ii) **UNIVERSITY LEVEL REQUIREMENTS**

As specified in Section 2.1.2.

(iii) **UNRESTRICTED ELECTIVES**

As specified in Section 2.1.2.

University Scholars Programme (Computer Science)

Students in the University Scholars Programme who choose the Bachelor of Computing (Computer Science) major will take the four-year Computer Science programme, but with the following variations:

1. They will not be required to take the following:
 - (a) The University Level Requirements (28 MCs)
 - (b) One Physics Module (4 MCs)
 - (c) One Life-Sciences Module (4 MCs)(These are replaced by appropriate First-Tier Scholars Modules.)
2. They will take UROP modules (CS3208 and CS3209) in place of CS3215 (Software Engineering Project). CS3208 and CS3209 are independent study modules (ISMs) and they will also be counted as two of the four Advanced Scholars Modules [8 equivalent MCs].
3. Four MCs (out of 48 MCs for USP) will count towards “Unrestricted Electives”.

² A Life-Science module can be LSM1302 (Genes and Society), LSM1304 (Microbes, Environment and Man), or courses approved by the Department of Computer Science.

³ A Physics module can be PC1143 (Physics III), PC1144 (Physics IV), PC1221 (Fundamentals of Physics I), PC1222 (Fundamentals of Physics II), or courses approved by the Department of Computer Science.

Table 1: Summary of degree requirement for B.Comp. (Computer Science)

Modules	Modular Credits	Subtotals
UNIVERSITY LEVEL REQUIREMENTS		28
PROGRAMME REQUIREMENTS		110
<i>Common Essentials</i>		
CS1101/S Programming Methodology	5	
CS1102/S Data Structures and Algorithms	5	
CS1104 Computer Organisation	4	
CS2102S Database Systems	5	
CS2103 Software Engineering	4	
CS2105 Computer Networks I	4	
<i>Major Requirements</i>		
<i>Computer Science Related</i>		
CS1231 Discrete Structures	4	
CS2106 Operating Systems	4	
CS3212 Programming Languages	4	
CS3215 Software Engineering Project	8	
CS3230 Design and Analysis of Algorithms	4	
8 MCs from CS Recommended Course list ⁴	8	
16 MCs from 4000/5000-level modules in A1 to A4	16	
CS4101 Honours Project	12	
CS4102 Technical and Management Training	0	
<i>Science Related</i>		
MA1505C or MA1505 Mathematics I	4	
MA1101R Linear Algebra I	4	
ST2131 Probability	4	
Life Science Module ⁵	4	
Physics Module ⁶	3	
<i>Others</i>		
CS2301 Business and Technical Communication	4	
UNRESTRICTED ELECTIVES		22
Grand Total		160

⁴ The **CS Recommended** Course list includes: CS3211 (Parallel and Concurrent Programming), CS3220 (Computer Architectures), CS3231 (Theory of Computation), CS3234 (Logic and Formal Systems), CS3243 (Foundations of Artificial Intelligence), and other relevant courses approved by the Department of Computer Science.

⁵ A Life-Science module can be LSM1302 (Genes and Society), LSM1304 (Microbes, Environment and Man), or courses approved by the Department of Computer Science.

⁶ A Physics module can be PC1143 (Physics III), PC1144 (Physics IV), PC1221 (Fundamentals of Physics I), PC1222 (Fundamentals of Physics II), or courses approved by the Department of Computer Science.

Bachelor of Computing

Overview

The 3-year Bachelor of Computing programme is designed to provide a sound scientific education, targeted at the needs of local and regional IT users and vendors. The programme combines *theoretical training* with *practical technology experience*. Students will develop professional competence in programming, abstraction, and conceptual skills of computing.

Graduates will meet national IT manpower needs in major job segments such as programmer analyst, systems analyst, systems programmer, system integrators and end user support analyst. They will be able to contribute immediately to the development needs of the local and regional economies.

Students in this programme are required to choose a focus of study. In order to meet diverging demand in IT practice, the 3-year Bachelor of Computing Programme consists of two foci of studies:

The **Technology focus** aims to equip students with strong technology know-how so that they can stride forward alongside the advancement of computing technology.

The **Business focus** aims to equip students with sound business knowledge in relation to information technology, including the operation of E-Commerce.

Degree Requirements

The 3-year Bachelor of Computing programme degree requirement is at least 120 modular credits. Modules are classified as follows (note that every module can only be counted towards satisfying exactly one requirement):

(i) **PROGRAMME REQUIREMENTS**

a. Common Essentials

CS1101 or CS1101S	Programming Methodology
CS1102 or CS1102S	Data Structures and Algorithms
CS1104	Computer Organisation
CS2102	Database Systems
CS2103	Software Engineering
CS2105	Computer Networks I

b. Major Requirements

Technology Focus

Computing Related

CS1231	Discrete Structures
CS2104	Programming Language Concepts
CS2106	Operating Systems
CS3214	Information Systems Development Project

Complete at least 12 modular credits from Technology Requirement by taking elective areas A1 to A8, with at least two modules chosen from the following modules offered by School of Computing:

Modules in elective area A8
Modules on Computer Security
Modules on Human-Computer Interaction
Modules on E-Commerce
Modules on Computer Networks

Science Related

MA1505C Mathematics I or MA1505 Mathematics I	
MA1101R	Linear Algebra
ST2131	Probability

A Life-Sciences Module⁷

Others

CS2301 Business and Technical Communication

Business Focus

Computing Related

CS1105	Computing and Society
CS1231	Discrete Structures
CS2250	Fundamentals of Information Systems
CS3214	Information Systems Development Project
CS3265	Economics of E-Business
CS3266	E-Commerce Technologies
CS2301	Business and Technical Communication

Complete at least 12 modular credits from Business Requirement by taking elective areas A1 to A8, with at least two modules chosen from the following modules offered by School of Computing:

Modules in elective area A6

CS3251	Technology Strategy and Management
CS3253	Management of Information Systems

Economics Related

EC1301	Principles of Economics
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Science Related

ST2334	Probabilities and Statistics
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(ii) **UNIVERSITY LEVEL REQUIREMENTS**

As specified in Section 2.1.2.

(iii) **UNRESTRICTED ELECTIVES**

As specified in Section 2.1.2.

⁷ A Life-Science module can be LSM1302 (Genes and Society), LSM1304 (Microbes, Environment and Man), or courses approved by the Department of Computer Science.

Table 2: Summary of degree requirement for B.Comp. with Technology Focus

Modules	Modular Credits	Subtotals
UNIVERSITY LEVEL REQUIREMENTS		20
PROGRAMME REQUIREMENTS		78
Common Essentials		
CS1101/S Programming Methodology	5	
CS1102/S Data Structures and Algorithms	5	
CS1104 Computer Organisation	4	
CS2102 Database Systems	4	
CS2103 Software Engineering	4	
CS2105 Computer Networks I	4	
Major Requirements		
<i>Computing Related</i>		
CS1231 Discrete Structures	4	
CS2104 Programming Language Concepts	4	
CS2106 Operating Systems	4	
CS3214 Information Systems Development Project	8	
12 MCs meeting Technology requirement ⁸	12	
<i>Science Related</i>		
MA1505C or MA1505 Mathematics I	4	
MA1101R Linear Algebra I	4	
ST2131 Probability	4	
Life Science Module ⁹	4	
<i>Others</i>		
CS2301 Business and Technical Communication	4	
UNRESTRICTED ELECTIVES		22
Grand Total		120

⁸ To satisfy the **Technology** requirement, students must make up 12 MCs by taking courses from elective areas A1 to A8, with at least two modules chosen from the following categories of modules offered by School of Computing: Modules from elective area A8, computer security, human-computer interaction, e-commerce, computer networks.

⁹ A Life-Science module can be LSM1302 (Genes and Society), LSM1304 (Microbes, Environment and Man), or courses approved by the Department of Computer Science

Table 3: Summary of degree requirement for B.Comp. with Business Focus

Modules	Modular Credits	Subtotals
UNIVERSITY LEVEL REQUIREMENTS		20
PROGRAMME REQUIREMENTS		79
<i>Common Essentials</i>		
CS1101/S Programming Methodology	5	
CS1102/S Data Structures and Algorithms	5	
CS1104 Computer Organisation	4	
CS2102 Database Systems	4	
CS2103 Software Engineering	4	
CS2105 Computer Networks I	4	
<i>Major Requirements</i>		
<i>Computing Related</i>		
CS1105 Computing and Society	4	
CS1231 Discrete Structures	4	
CS2250 Fundamentals of Information Systems	4	
CS3214 Information Systems Development Project	8	
CS3265 Economics of E-Business	4	
CS3266 E-Commerce Technologies	5	
12 MCs meeting Business requirement ¹⁰	12	
<i>Science Related</i>		
ST2334 Probability and Statistics	4	
<i>Economics Related</i>		
EC1301 Principles of Economics	4	
<i>Others</i>		
CS2301 Business and Technical Communication	4	
UNRESTRICTED ELECTIVES		21
Grand Total		120

¹⁰ To satisfy the **Business** requirement, students must make up 12 modular credits by taking courses from elective areas A1 to A8, with at least two modules chosen from the following modules offered by School of Computing: Modules from elective area A6, CS3251 (Technology Strategy and Management) and CS3253 (Management of Information Systems).