Vision
Be a Global Leader in Computing, Advancing the Frontiers of new knowledge through Learning and Research.

Mission
To advance and enhance computing knowledge, fostering global strategic alliances, promoting cross disciplinary research, producing socially responsible professionals with entrepreneurial skills, leadership qualities and integrity contributing to position the country as a knowledge hub in the region.
Disclaimer

This handbook is compiled with information received up to April 2018.

It is hereby informed this Handbook is only for general information and does not represent accurately the relevant By Laws and Regulations.

Any information contained herein should be confirmed by reference to the relevant authority.

For the latest version of the handbook please visit our website

http://www.ucsc.cmb.ac.lk
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I am indeed pleased to issue this brief message on the occasion of publishing the Masters Handbook 2017-18 compiled for Master of Science in Computer Science, Master of Computer Science, Master of Information Technology and Master of Information Technology degree programs by the University of Colombo School of Computing. I firmly believe that, a hand book giving all required information for the new entrants to the UCSC, will be immensely beneficial for them.

The Institute of Computer Technology (ICT), the predecessor of the present UCSC was established in the year 1987. With the subsequent developments taking place in the area of information and communication technologies as well as the eagerly awaited structural changes in IT education in Sri Lanka, the need of a fully pledged higher educational institute teaching IT and communication related subjects were seriously contemplated by the policy makers of the University. A lot of intellectual inputs were considered at the ensuing discussions on how such issues are to be addressed and finally the University of Colombo School of Computing was established in 2002 replacing then the ICT and Department of Statistics and Computer Science. The Master Degree programme at UCSC can be demonstrated as a golden opportunity for those who are interested in obtaining a globally recognized degree from the first centre of higher learning in ICT in Sri Lanka. I will be failing in my duty, if I do not mention the name of the late Professor V K Samaranayake, without whose services and dedicated contribution none of the ICT, DSCS or the UCSC would have become a reality. I am happy to note that the UCSC at present has become a much sought after institution for IT education in Sri Lanka. I would also like to note with pleasure that, under the able guidance of the current Director Professor K P Hewagamage, the academic staff of the UCSC is well-trained with many of them having earned their doctoral degree from highly recognized universities, fellowships and memberships from world renowned professional associations.

I am sure that, this handbook will provide the new entrants with up to date information about the place of learning they are about to enter. A handbook is always useful not only to the students but to those who wish to have an in-depth
knowledge of the activities of the school including the operational mechanism of both academic and administrative spheres. I would like to thank the Handbook Committee of the UCSC for embarking on a very useful and constructive exercise.

As students of this University I hope that you will derive maximum benefits from the treasured opportunities that will be bestowed to you and be broadminded responsible citizens in future.

Finally, let me again extend my best wishes to you for a rewarding experience at the University of Colombo.

Professor Lakshman Dissanayake
Vice Chancellor of the University of Colombo
As the Director of the University of Colombo School of Computing (UCSC), it gives me an immense pleasure to welcome you to the Masters Degree programme for the academic year 2018. From the starting, the UCSC has been achieving eminence above every other computing learning centre in Sri Lanka with the tremendous contribution of highly qualified academic staff including more than 25 senior lecturers with doctoral level qualification. Each member of our academic and non academic staff is dedicated to the development of the students of our institute. As a higher learning centre, we have been privileged to receive high reputation and recognition from the industry and this has opened the path to high rate of employments for the graduates. Simultaneously, we have well established research groups with international recognition and high level of curriculum-complies with ACM IEEE curriculum standards.

The Masters Degree programme has been specially designed for the graduates with computing degree who wish to obtain a post graduate qualification from the prominent metropolitan university. While enhancing knowledge, this also provides a stepping stone for further research in the field. The Masters Degree programme has a long history at UCSC. The initiation of the original programme of Masters Degree marked in 1990.

UCSC as a centre of higher education is committed to provide an environment which is conducive to carry out the vision and the mission of our institute. Our strategic goal is to focus on the quality of our degree programmes while also developing the quality of our students and ultimately enhancing their employment prospects. Finally, on behalf of the members of the University of Colombo School of Computing I would like to extend my best wishes with your studies and with the new higher learning experience that you are going to gain at UCSC.

Professor K P Hewagamage
Director of the University of Colombo School of Computing
Vanniarachchige Kithsiri Samaranayake was born on the 22nd of May 1939 and had his early education in Hewavitharana Vidyalaya, Rajagiriya where his father was the principal and his mother was a teacher. He entered Ananda College in 1948 and then Royal College through a competitive examination in 1950.

Prof. V.K.Samaranayake entered the University of Ceylon to read for a degree in Science in 1956 having completed his secondary education at Ananda and Royal Colleges. He was selected to do a Special degree in Mathematics and obtained a First Class Honours degree in 1961.

Prof. Samaranayake entered the Imperial College, London in 1963 on a state scholarship for his postgraduate studies and then moved on to University College, London to complete his PhD in record time before returning home in 1966. At the age of just 35, in recognition of his great scholarship, the University of Colombo appointed him to its highest Academic position of Professor of Mathematics in 1974. He was subsequently appointed Senior Professor of Mathematics in 1984, invited to be the first Senior Professor of the newly created Chair in Computer Science in 1996 and appointed Emeritus Professor of the University of Colombo after his retirement in 2004. In recognition of which the University honoured him with the title Professor Emeritus of Computer Science, and conferred on him the Degree of Doctor of Science, Honoris Causa at its subsequent Convocation.

As it is not possible to confine the appreciation of his enormous service to the nation and his illustrious career as an academic and an administrator to a few pages, some of the significant milestones of his illustrious career are outlined below.
• 1987- He was appointed as Chairman of the Computer and Information Technology Council of Sri Lanka (CINTEC), where he served for 12 years. During this period he was also tasked with chairing the Presidential Task Force on Integrated R & D in Science & Technology 1997-2000 and the National Y2K Task Force in Sri Lanka 1998-2000.

• 1992 - He initiated the participation of Sri Lankan school children in Computer Programming, by committing CINTEC funds for sending teams of 4 to the International Olympiad in Informatics (IOI). Through his great foresight, to date, Sri Lanka has been able to secure 3 Gold, 5 Silver and 13 Bronze medals at successive IOI’s with a record of never returning without a medal since 1994

• In 1995 he was instrumental in setting up intensive discussions with Sri Lanka Telecom, to commence Internet services in Sri Lanka. These discussions eventually brought LEARN and Internet connectivity to Sri Lanka in 1996.

• He was instrumental in organizing the Information Technology industry at large by forming associations for Computer Training Organizations (ACTOS), for the Software Industry (SLASI), and for the Computer Vendors (SLCVA). With foresight he also created the umbrella organization for these associations in the form of the Federation of Information Technology Industry Associations (FITIA) which recently hosted the largest ICT event in Sri Lanka – the ASOCIO ICT Summit. He has also been involved with the well known ICT Trade Exhibition organization, INFOTEL where he has held the chairmanship from 1997. INFOTEL has in turn been the major funding organization for many industry and human resource development efforts in the field of ICT.

• In 1984 he had his first major breakthrough with the full backing of the then Chancellor, Dr. P. R. Anthonis and Vice Chancellor Prof. Stanley Wijesundara in the form of a substantial JICA grant from the Government of Japan. Almost simultaneously, the UNDP provided some much needed research funding to build up Academic Faculty in Computer Science at the University of Colombo. Starting with the Statistical Unit, the Statistical Computing and Data Processing Centre within the Mathematics Department, Prof. Samaranayake first convinced the University to set up a Department of Statistics and Computer Science in 1985, the first of its kind in Sri Lanka, and then went onto create the first School in the university system in the form of the University of Colombo School of Computing (UCSC) in 2002.
• Commencing in the year 2000, Prof. Samaranayake initiated another major milestone in ICT HRD in Sri Lanka with the launch of the innovative Bachelor of Information Technology (BIT) External Degree programme which provides an ultimately scalable mechanism for affordable ICT education in a way of incorporating the private sector – a feat no other degree programme has been designed to do. Apart from the prestige of a University of Colombo degree to students, the BIT programme also has the indirect but most desirable effect of standardizing ICT education of an era where commercialism is threatening the quality of education.

• Prof. Samaranayake’s involvement in the scientific community has been really impressive with the Sri Lanka Association for the Advancement of Science (SLAAS) electing him to the office of General President in 1994 and the National Academy of Sciences of Sri Lanka electing him as a Fellow of the Academy, its Vice President and finally its President for 1998-99.

• His quest for capacity building in ICT human resources can be seen more clearly by his single handed contribution in this area at the University of Colombo – making it the showcase among the entire university system in Sri Lanka and beyond. Investing on human resource development in ICT is also a huge risk – that of aiding in the brain drain. This is where Prof. Samaranayake’s breadth of vision and almost unreasonable trust, especially in the case of training Faculty of the University, is most clearly seen. Commencing with the meager funding resources extended by donors in 1970’s an an era when the developed countries themselves were just getting into the area of serious ICT human resource development, Prof. Samaranayake commenced his quest of directing all local and foreign funding to develop ICT Human Resource development at the University of Colombo.

• In recognition of his towering contribution in the field of ICT in the country, he has been bestowed with several national awards in the form of the Lions’ Club Gold Medal for the Most Outstanding Citizen of Sri Lanka in 1986, the Vishva Prasadini Award in 1996 on the occasion of the 80th birthday of the then Prime Minister Sirimavo Bandaranaike and the Vidya Jyothi Presidential Award in 1998.
• Prof. Samaranayake’s characteristic skill at excelling in multiple tasks is also demonstrated by his continuing involvement in research, being named a Fellow of the Kennedy School of Government at Harvard University, USA in 2001, Research Fellow at the National Centre for Digital Government at Harvard University, USA in 2003 and the impending appointment as Visiting Fellow in the Digital Vision Programme at Stanford University, USA in 2005. A particularly high point of this role was when he simultaneously chaired two International Conferences while playing a key role in the whole of the Government declared Information Technology Week in December 2004. He also continued as Chairman of the International Information Technology Conference till his untimely demise.
INTRODUCTION
THE UNIVERSITY OF COLOMBO

The University of Colombo has a history over 80 years as a leading higher educational provider in Sri Lanka. The University of Ceylon was established by the state council on April 1942. By 1950, the University of Ceylon had gained a reputation as an important centre of excellence in the Commonwealth. The Higher Education Act of 1966 established a National Council of Higher Education (NCHE) and later in 1972, under the University of Sri Lanka Act No. 1 of 1972, all universities were brought under one umbrella and made campuses of a single university and established as the University of Sri Lanka.

The University of Ceylon, Colombo was named the Colombo Campus of the University of Sri Lanka. This system prevailed until 1977. The University autonomy was weakened and as a result, a new Act was introduced in 1978. Under the Universities Act No. 16 of 1978, all campuses of then single university became independent universities. Accordingly, the University Of Colombo, Sri Lanka regained its autonomy in 1978. The University of Colombo now consists of nine faculties, one school (University of Colombo School of Computing), six institutes and several centers in addition to the Sri Palee Campus.

The University of Colombo is a public state university located primarily in Colombo, Sri Lanka. The University of Colombo is the oldest institute of modern higher education in Sri Lanka, specialized in the fields of natural, social, and applied sciences as well as mathematics, computer sciences, medicine, education, and law. It has been ranked among the top 10 universities in South Asia.
THE UNIVERSITY OF COLOMBO SCHOOL OF COMPUTING: HISTORICAL PERSPECTIVE

The teaching of computing at the University of Colombo started in 1967 in the Department of Mathematics. Later with the pioneering efforts of Professor V.K. Samaranayake, the statistical unit was enhanced as the Statistical Consultancy and Data Processing Service Centre. This paved the way to many future developments. By 1985, this centre had grown into the Department of Statistics and Computer Science (DSCS). The major function of this department was to conduct special degree programmes in Statistics and in computer science. The DSCS offered a computer science specialization programme, producing just 40 students per batch, in no way sufficient to meet the growing demand in the field of computer science.

In 1997, a batch of 50 students was directly taken to study computer science, through the University Grants Commission. However, by this time, it was realized by many that the computer science subdivision of the DSCS needed to be expanded as a separate department to meet the growing demand in the field of computer science. As a result, in 2001, the DSCS was separated into two departments, namely, Department of Computer Science and Department of Statistics.

The Institute of Computer Technology (ICT), which was also a brainchild of Prof. Samaranayake had a strong relationship with the industry at the same time enjoying a high institutional profile among foreign donor agencies. The ICT also enjoyed much more autonomy in their operations making it easier for receiving significant amounts of resources from Japan International Cooperation Agency (JICA), Swedish International Development Agency (Sida) and several other donors. The Information and Communication Technology offered postgraduate diploma programmes to train those who were entering the Information Technology industry with non-Information Technology degrees. The ICT also responded to the ever increasing demand for Information Technology professionals by the industry at the end of the millennium by introducing the first external Information Technology degree in the form of the Bachelor of Information Technology (BIT) in 2000.

The Department of Computer Science identified its own limitations of operating in the restrictive framework of a Faculty and at the same time it realized the importance of having a strong industry relationship for exploiting future growth potential. Thus the university understood the importance of a strategic merger between the industry focused ICT and the more theoretically oriented Department of Computer Science of the University of Colombo.
This merger gave birth to the University of Colombo School of Computing (UCSC) on 1st September 2002. Prof. V.K Samaranayake became the founder Director of the UCSC, whose proactive thinking set the path to achieve success in several succeeding endeavours of the UCSC. Through all this, the UCSC has been able to position itself as a centre of excellence in ICT in the university system of Sri Lanka.

In 2005, UCSC took a bold initiative and introduced a new degree programme Bachelor of Information and Communication Technology programme (BICT), to fill a widely felt gap in the industry for information systems specialists in recognition of the maturing of the fields of computer science and information and communication technology. In 2010/11 UCSC aligned all undergraduate curricular to meet the ACM/IEEE guidelines. With this in mind the Bachelor of Information and Communication Technology (BICT) degree was renamed as Information Systems (IS) and the Computer Science (CS) intake is provided an option to branch into a Software Engineering degree from the 2012/13 intake.

CURRENT DIRECTOR OF UCSC

Professor K P Hewagamage
(2016 - Present)

FORMER DIRECTORS OF UCSC

Late Vidya Jyothi
Prof. V K Samaranayake
(2002 - 2004)

Dr. A R Weerasinghe
(2004 - 2010)

Late Professor
G N Wikramanayake
(2010 - 2016)
UCSC AT A GLANCE

STUDENT POPULATION

≈ 800  ≈ 450  ≈ 50
UNDERGRADUATES  MASTERS  MPhil/ PhD

OUR DEGREE PROGRAMMES

Internal Undergraduate Degree Programmes
- Bachelor of Science in Computer Science (BSc. in CS)
- Bachelor of Science Honours in Computer Science (BSc. (Hons) in CS)
- Bachelor of Science Honours in Software Engineering (BSc. (Hons) in SE)
- Bachelor of Science in Information Systems (BSc. in IS)
- Bachelor of Science Honours in Information Systems (BSc. (Hons) in IS)

External Undergraduate Degree Programme
- Bachelor of Information Technology (BIT)

Postgraduate Degree Programmes
- Master of Computer Science (MCS)
- Master of Science in Computer Science (MSc. in CS)
- Master of Information Technology (MIT)
- Master of Information Security (MIS)

Postgraduate Research Degrees
- Master of Philosophy (MPhil)
- Doctor of Philosophy (PhD)
MILESTONES OF POSTGRADUATE TAUGHT COURSES AT UCSC/DCS/DSCS/ICT

1986 - Postgraduate Diploma in Computer Applications
1988 - Postgraduate Diploma in Information Technology with the assistance of Japan International Cooperation Agency - JICA
1990 - First MSc in Computer Science with the assistance of Cardiff University (UK) with funding from UNDP
2002 - Master of Information Technology, Master of Computer Science, Master of Advanced Computing
2009 - Master of Science in Information Security
2017 - Master of Information Technology, Master of Computer Science, Master of Science in Computer Science

MILESTONES IN THE PIONEERING EFFORTS IN COMPUTING OF THE UNIVERSITY OF COLOMBO

Late 1960s - First mechanical calculators of Nippon and Facit models were used for teaching Statistics in the department of Mathematics
1967 - Teaching of Fortran as a programming language began at then University of Ceylon, Colombo
1968 - Establishment of the Statistical Unit under the department of Mathematics
1970 - The Statistical Unit was formally approved by the senate of the University of Ceylon, Colombo, at its 20th meeting held on 26-06-1970 as a unit for the entire university to undertake statistical and data processing
1970s - The University of Colombo started teaching Fortran programming on mainframe ICL 1901 and the practical sessions were carried out using IBM Model 29 alpha-numeric punch card machine at the State Engineering Corporation, and subsequently the IBM mainframe S/360 Model 25 at the Department of Census and Statistics was used for studies.
1972 - Under the Higher Education Reforms that took place in 1972 (Osmond Jayratne Report), the Department of Mathematics and the Statistical Unit of the University of Colombo made a ground-breaking attempt to initiate new course units in Mathematics, Statistics and Fortran Programming leading to Statistical Services job stream for the students with the new Special Degree in Development Studies in the Faculty of Arts.
1974 - Establishment of the Statistical Consultancy and Data Processing Service
1974 - The University of Reading, UK and the University of Colombo established a collaboration in
1974 - for a period of 10 years and the University of Reading contributed to the Statistical Unit to become a National Centre for Statistical Research, Teaching and Consultancy
1977 - Under the Colombo-Reading Collaboration, the Department was gifted a HP 9825 Mini Computer with a Card Reader
1980 - A Data General Eclipse NOVA/4 minicomputer was obtained by a loan in 1980 for one year and housed in the Department of Mathematics

1980 - Establishment of Computer Centre

1981 - The first mini computer Data General Eclipse Model S/140 was purchased with time sharing OS and 16 VDU for Fortran and Cobol Programming

1981 - The curriculum in Computing was enhanced by introducing a new course in Numerical Analysis for the undergraduates of the Faculty of Science

1981 - The department of Mathematics granted its first local PHD in Computing and Statistics for the first time in the history of the University Education in Sri Lanka

1982 - BBC computers were used to process and release, to Rupawahini, the national TV the results of the 1982 presidential elections (first ever computerization of a national event); proliferation of BBC microcomputers over Econet, the first LAN for file sharing, printing and Basic programming in a 30 machine PC lab; Introduction of first generation personal computers- KayPro CP/M.

1982 - Three Certificate courses in Computer Applications, specially designed for users in Scientific, Technological and Financial & Management were introduced. Three courses are Certificate Course in Computer Applications in Science and Technology using FORTRAN, Certificate Course in Computer Applications in Financial & Management using BUSINESS BASIC and Certificate Course in Computer Applications in Finance & Management using COBOL

1982 - Permission was granted to introduce two new course units for 3rd year students under Applied Mathematics Module. The two course units are AM 204- Scientific Computing and AM 205- System Analysis and Computer Application in Finance and Management.

1983 - Computer Assisted Education was introduced by the Ministry of Education to three schools as a pilot project and the University of Colombo assisted the Ministry in launching its Computer Education Programme through teacher training.

1984 - Tandy Radio Shack TRS model 80 desktop machine running XENIX for Unix/C programming was installed.

1984 - The university of Colombo organised the First Asian Regional College on Microprocessor Technology and Applications held in Sri Lanka 4th to 29th June in collaboration with the International Centre for Theoretical Physics, Trieste, in association with the University Grants Commission and the Computer and Information Technology council (CINTEC) of Sri Lanka.

1985 - Standard IBM PC/XT PC based on 8086/88 running MSDOS was introduced for Labs.

1985 - Establishment of the Department of Statistics and Computer Science (DSCS)

1986 - Introduction of the first ever Postgraduate Diploma in Computer Applications, first ever of its kind in Sri Lanka
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<th>Year</th>
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<td>1987</td>
<td>Establishment of the Institute of Computer Technology (ICT) (Funded by JICA)</td>
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<td>1987</td>
<td>Collaboration between the Department of Statistics and Computer Science of the University of Colombo, Sri Lanka and the Department of Computing Mathematics, University of Wales College of Cardiff, United Kingdom was established.</td>
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<td>1988</td>
<td>NEC 430 mainframe was donated by Japan with 60 terminals for interactive Computing</td>
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<td>1989</td>
<td>Introduction of the first ever MSc Degree in Computer Science (Funded by UNDP)</td>
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<td>1989</td>
<td>Occupation of the Computer Science Building Complex</td>
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<td>1990</td>
<td>First Bachelor’s degree in Computer Science in Sri Lanka was launched on 14th July by the Department of Statistics and Computer Science.</td>
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<td>1992</td>
<td>Sun Microsystems Workstation Lab with 10 machines running SunOS 4.1.2 with a 10Mbps Ethernet for Scientific Computing was installed.</td>
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<td>1992</td>
<td>Commencement of Third Country Training Programs (TCTP) (Supported by JICA)</td>
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<td>1994</td>
<td>A dial up email service was provided for the University of Colombo when internet was first launched in Sri Lanka.</td>
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<td>1997</td>
<td>Online Internet access via Lanka Education and Academic Research Network a Sri Lanka Telecom based 64kbps leased line network; British Computer society accreditation was received for the degrees in Computer Science.</td>
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<td>1997</td>
<td>Director ICT was Presented with JICA President’s Award for International Corporation</td>
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<td>1998</td>
<td>International Conference in Information Technology (IITC) was organised by UCSC and subsequently named as ICTER with IEEE technical sponsorship</td>
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<td>1998</td>
<td>Commencement of Graduate Training Programme</td>
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<td>1999</td>
<td>Institute of Computer Technology Presented with JICA President’s Award</td>
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<td>2000</td>
<td>A joint PHD program was started for the internal staff of Sri Lankan universities with UCSC as focal point and with the assistance of Swedish Universities of Uppsala, KTH, Gothenburg, Mid Sweden lunched (Supported by Sida)</td>
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<tr>
<td>2000</td>
<td>The Sinhala language Unicode was designed and published</td>
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<td>2000</td>
<td>Introduction of the Bachelor of information Technology (BIT) External Degree Programme</td>
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<td>2001</td>
<td>Commissioning of Campus Wide Fiber Network (Funded by Sida)</td>
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<td>2001</td>
<td>Establishment of the Department of Computer Science (DCS)</td>
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<td>2002</td>
<td>Establishment of the Advanced Media Technology Centre (ADMTC) (Supported by JICA)</td>
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<td>2002</td>
<td>Establishment of the UCSC by the merge of the ICT &amp; DCS</td>
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2002 - Commencement of Advanced MSc (Research based) and Master of Information Technology Programmes

2002 - Implementation of Virtual Learning Environment for BIT (External Degree)

2003 - Funds were received from IDRC for local language research through PAN localisation research project

2004 - Introduction of the Information & Communication Technology Degree Programme for Students

2005 - The third phase of the third country training programme with JICA collaboration was launched

2005 - Extension of Virtual Learning Environment for all UCSC Students

2006 - UCSC launched an International Journal of ICT for Emerging Regions (ICTER)

2009 - Linneas-Palmer exchange program was established for the staff and students in collaboration with Umea University, Sweden

2009 - Commencement of Master of Science in Information Security Degree Programme

2011 - Establishment of the Center for Digital Forensics

2012 - Commencement of Masters in Bioinformatics jointly with IBMBB

2012 - Software Engineering Specialization introduced to the Computer Science Degree Programme

2012 - BICT Degree Programme renamed as Information Systems

2013 - With the active involvement of UCSC, most public services available at the Department of Register General, Department of Land Registry, Police fingerprinting and other services were computerised under the Sri Lankan government e-services drive

2013 - Student Exchange Programme with Umea University, Sweden

2013 - Restructuring of Masters Programmes as Master of Computer Science & Master of Information Technology

2015 - A Separate Bachelor’s Degree in Information Systems and Software engineering was introduced at the University of Colombo School of Computing

2017 - Celebrating the Golden Jubilee of Computing at University of Colombo

2017 - Restructuring of Master of Information Technology, Master of Computer Science, Master of Information Security (MIS) and Introduction of Master of Science in Computer Science (MSc. in CS)
KEY STRENGTHS

According to recent (July 2016) Webometric ranking, University of Colombo continues its position as number one university in Sri Lanka. Most importantly, it has improved 146 positions from the rank of January 2016 and with this improvement, the University of Colombo has now become the only university in Sri Lanka which is seen within the top 2000 universities in the world. This also suggests that the University of Colombo is positioned in the upper 17 percent of all the higher educational institutions in the world that were evaluated by Webometric ranking.

Highly Qualified Academic Staff

Competency of the academic staff is one of the crucial factors in UCSC’s focus on high quality academic excellence. The UCSC presently has 3 professors, 25 PhD qualified academics graduated from leading universities in UK, Canada, Australia, Japan, Sweden etc., 4 MPhil qualified staff members and masters qualified staff to assist in the academic activities. Another key strength of the staff is their expertise in diverse domains in Computing. The academic staff publish their research findings in reputed Journals and Conferences in each year. The human resource which has been built up over a long period of time with foresight as a long-term investment is now bearing rich dividends.

Strong Research Potential

With the strong research training investment over the past decades, the UCSC now possesses arguably the strongest research potential in computing in Sri Lanka; one which matches that which is available in the best of international universities. UCSC is reputed for its international collaboration with research teams in Europe and Asia through the funding agencies such as Japan International Corporation Agency (JICA), Swedish International Development Agency (SIDA), International Development Research Centre (IDRC). Several recent research outcomes at UCSC have received local and international awards.
Healthy Industry-University Relationship

The Professional Development Centre (PDC) of the UCSC develops and promotes strategic relationships with key organizations in the Information Technology industry. PDC places over 250 students each year on internship as a part of their undergraduate degrees in the software industry for a period of six months. The Computing Services Centre (CSC) of the UCSC undertakes consultancy work for state and private sector organizations. The CSC also conducts short term training courses in diverse areas of emerging technologies.

Funding and Facilities

One of the cornerstones of the success of the UCSC and its predecessors has been the international level facilities available to faculty and students. It has been one of the key factors through which staff retention has been possible. This resource has been strengthened over years through the support of international donor agencies which has been readily forthcoming owing to our past track record. In addition to this, the UCSC’s earning through consultancy and research has made it self-sufficient with respect to operational expenses and the acquisition of state-of-the-art infrastructure.
ORGANIZATION OF THE UCSC

DEPARTMENTS OF THE UCSC

The primary activity is to deliver high quality undergraduate and postgraduate degree programmes in computing. The UCSC has three academic departments, seven administration and finance divisions and six centres. The academic staff members are attached to the three academic departments based on their specialization and teaching expertise. Main administrative and operational units are shown in the Figure 1.

Following are the three academic departments.

- Department of Computation and Intelligent Systems (CIS)
- Department of Communication and Media Technologies (CMT)
- Department of Information Systems Engineering (ISE)

Centres at the UCSC

<table>
<thead>
<tr>
<th>Centres</th>
</tr>
</thead>
<tbody>
<tr>
<td>Advanced Digital Media Technology Centre (ADMTC)</td>
</tr>
<tr>
<td>Centre for Digital Forensics (CDF)</td>
</tr>
<tr>
<td>Computing Service Centre (CSC)</td>
</tr>
<tr>
<td>External Degrees Centre (EDC)</td>
</tr>
<tr>
<td>e-Learning Centre (e-LC)</td>
</tr>
<tr>
<td>Professional Development Centre (PDC)</td>
</tr>
</tbody>
</table>

Board of Studies at the UCSC

<table>
<thead>
<tr>
<th>Board of Studies, which consists of IUD, RHD and EEP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internal Undergraduate Degrees (IUD)</td>
</tr>
<tr>
<td>Research and Higher Degrees (RHD)</td>
</tr>
<tr>
<td>External and Extension Programmes (EEP)</td>
</tr>
</tbody>
</table>
Figure 1: Administrative and Operational Structure at the UCSC
CENTRES OF THE UCSC

UCSC also performs several secondary activities. These activities are organized under six separate centres. Each centre has a coordinator who manages the day-to-day operations of the centre. The six centres are as follows:

**Advanced Digital Media Technology Centre (ADMTC)**

Advanced Digital Media Technology Centre (ADMTC) was established in 1987 under the “Project for Human Resource Development in Information Technology through capacity building of the UCSC” with the support of Japan International Cooperation Agency. ADMTC is equipped with a state of the art digital studio and multimedia laboratories. The centre conducts training programmes in multimedia, e-Learning and digital media production. The center produces video leaning materials for UCSC’s external degree programme BIT.

Coordinator: Mr. S. T. Nandasara
For more details visit the website: http://www.ucsc.cmb.ac.lk/admtc

**Centre for Digital Forensics (CDF)**

Centre for Digital Forensics (CDF) was established in 2011. The advisory panel of the centre consists of UCSC and foreign academic experts. UCSC plays a key role in assisting the Sri Lankan Police and the Criminal Investigation Department since 2003 in cyber crime, and digital forensic investigations.

Coordinator: Mr. K. S. Goonathilake
For more details visit the website: http://www.ucsc.cmb.ac.lk/dfc

**Computing Services Centre (CSC)**

The Computing Services Centre (CSC) is the consultancy arm of the UCSC. CSC provides consultancy services on systems development, tender evaluation, employee selection tests etc. CSC provides tailor-made training programmes for the private and public sector organisations. The Software Development Unit (SDU) which operates under the perview CSC carries out the software development projects. The CSC has been offering services to many government organizations. Among such projects are the automation of election results, cricket score board for Rupavahini Corporation. The academic staff of the University of Colombo has been assisting the office of the election commissiner with automation since 1982.

Coordinator: Dr. K. L. Jayaratne
For more details visit the website: http://www.ucsc.cmb.ac.lk/csc
e-Learning Centre (e-LC)

The UCSC was identified by donor agencies such as Swedish International Development Agency (SIDA) and European Union Asia Link Programme as an ideal location for a centre of excellence in e-Learning. In 2003, e-Learning Centre (e-LC) has established an online learning environment at UCSC. The centre develops interactive e-Learning content and provide training. The online virtual learning environments of the masters degree programs (MCS, MSc. in CS, MIT, MIS), research postgraduate degree programs and external degree program BIT are managed by the e-LC.

Coordinator: Dr. D. D. Karunaratne
For more details visit the website: http://www.ucsc.cmb.ac.lk/elc

External Degree Centre (EDC)

The External Degrees Centre (EDC) offers a three year external degree programme, Bachelor of Information Technology (BIT). This program aims to widen the higher educational opportunities for the students who have been unsuccessful in securing admission for a fulltime studying programme in the state university system. The BIT degree programme commenced in the year 2000 and has produced over thousand graduates up to date.

Coordinator: Mr. L. P. Jayasinghe
For more details visit the website: http://www.bit.lk

Professional Development Centre (PDC)

The mandates of the Professional Development Centre (PDC) includes liaising with the software industry in enhancing the professional skills of undergraduates. The PDC is responsible for industrial placements and visits for internal undergraduates. PDC assists undergraduate programs in enhancing soft skills, entrepreneurship skills and community service skills to pursue successful careers.

Coordinator: Dr. S. M. K. D. Arunathileka
For more details visit the website: http://www.ucsc.cmb.ac.lk/pdc
STUDENT SERVICES

Library
The UCSC Library has a rich collection of computing books, magazines, and conference proceedings. The resource collection also includes novels for leisure reading. The library maintains a collection of MPhil/PhD thesis and Masters dissertations. The library provides access to IEEE papers and UCCS digital library.

The library opening hours are as follows:

<table>
<thead>
<tr>
<th>Weekdays</th>
<th>9.00 am – 6.00 pm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weekends</td>
<td>9.00 am – 6.00 pm (for postgraduate Students)</td>
</tr>
</tbody>
</table>

For further information refer http://ucsc.cmb.ac.lk/library/

Computing Laboratories
UCSC has eight laboratories with over 250 computers. The username and password to access systems are provided by the Network Operating Centre. Wi-Fi access facilities are provided for the registered students on request.

Network Services
With the view of centralizing the operations of the computer network of the University of Colombo, the Network Operating Centre (NOC) was established in 2002. NOC is located at UCSC and it is the central position, which provides the network connections to all the other faculties and centres in the university. The Internet facility to the university through the LEARN network is also channeled via the NOC. The centre is well equipped with modern networking equipment including servers, switches, routers and test equipment received under the financial assistance of SIDA and ADB. The entire backbone cable system of the campus wide network is centered at the NOC providing the connectivity to over 2000 users.

Wi-Fi Connectivity
The students are required to submit a completed Wi-Fi connection request form to the NOC during office hours. The request forms can be downloaded from UCSC web site (ucsc.lk/noc). One device per student is registered and the service will be bound to the physical address of the device. The service will be activated by one week of the submission of the request.

The UCSC monitors all user activities according to UGC’s policy and guidelines. Students are strongly advised not to engage in unethical or illegal activities using
internet connection and computing resources. There is a limited bandwidth allocation for each user.

For further information visit http://ucsc.cmb.ac.lk/noc/

### Online Learning Material

Students are provided a login to the postgraduate virtual learning environment (PGVLE) at the commencement of the programme. Student are required to refer the PGVLE for learning materials, submission of assignments and masters programme related notices etc.

For further information visit http://pgvle.ucsc.cmb.ac.lk/

### Canteen Facilities

The UCSC Canteen which is located inside the UCSC building complex, is open for the students during the academic semesters from 7.00 a.m. to 6.00 p.m. Canteens of the other faculties are also available for the use of UCSC students.

### Photocopy Facility

Photocopy facility is available at the photocopy unit located at the ground floor of the canteen area (East Wing entrance of the UCSC building).

### OTHER SERVICES

#### Audio Visual Rewarding

An advanced digital studio is equipped with state-of-the-art digital equipment such as digital video cameras, video switcher, editing control unit, audio mixer, lighting system and non-linear editing system. It is one of the best studios in Sri Lanka and is playing a central role in providing distance-learning material.

#### Maintenance Unit

The maintenance unit of the UCSC provides technical support to computer laboratories, and other resources such as central A/C system, water supply, power supply and PC maintenance.

#### Video Conferencing Facilities

UCSC possesses the state-of-the-art video conferencing equipment.

#### Auditorium

A new state-of-the-art multipurpose auditorium is available with over 400 seating capacity.
POSTGRADUATE EDUCATION

MASTERS PROGRAMMES
The UCSC conducts four different masters programmes to cater towards four distinct categories of postgraduate students.

**Master of Computer Science**
The Master of Computer Science programme is designed for computing professionals who already possess a degree in computing and who wish to acquire a postgraduate qualification in Computer Science.

**Master of Science in Computer Science**
Master of Science in Computer Science is designed for those who wish to acquire a Computer Science degree with a research focus.

**Master of Information Technology Programme**
The Master of Information Technology programme is targeted at graduates in disciplines other than computing who wish to pursue a career in an Information Technology related area. This is also suitable for those who wish to specialize in a multi-disciplinary field.

**Master of Information Security Programme**
The Master of Science in Information Security programme is designed for graduates who wish to acquire a postgraduate qualification in the area of information security. This programme offers mid-career opportunities for those working in the areas of information technology, information system audit and information security.

**Master of Bioinformatics**
UCSC together with the Institute of Biochemistry, Molecular Biology and Biotechnology (IBMBB) offers a full-time Masters degree in Bioinformatics. This programme is administered by the IBMBB.

**MPhil & PhD PROGRAMMES**
UCSC offers Master of Philosophy (M.Phil) and the Doctor of Philosophy (PhD) in the field of computing.

1. Master of Philosophy (MPhil) in Computing(Full time/Part Time)
2. Doctor of Philosophy (PhD) in Computing(Full time/Part Time)

**New Masters Programmes**
1. Master of Cybersecurity to commence in 2018 (International distance Masters Degree)
2. Master of Computing by research (one year program) is proposed to be introduced in 2019

For further details on postgraduate degree programmes by research, visit the UCSC website: www.ucsc.cmb.ac.lk/pg
RESEARCH AT THE UCSC

3D Graphic and Virtual Reality Research Group

This group is concentrating on research on 3D computer graphics, virtual and augmented reality and computer vision. The recent research projects include an interactive environment for virtual heritage using augmented reality, use of SIFT features for human face recognition, image compression techniques, vehicle number plate recognition, perception enhanced virtual environment for maritime applications, hair simulation for 3D modelling and interactive 3D serious game development.

Distributed and Parallel Computing Group

This group conducts research on programming models for multi-core architectures. Resources include two clusters (with 7 and 14 nodes respectively) provided by a SPIDER grant. The group is also in possession of a new 8-node cluster with nvidia multi-core cards under Sida funding. Apart from research, they also provide HPC services to scientists for molecular modelling (Dept. of Chemistry, UoC) and sea bed modelling (NARA). They hope to provide e-science services to the scientific community of Sri Lanka via the LEARN and also with access to TIEN-3, the research Internet.

eHealth Group

There is a strong group of professionals in the UCSC engaged in the eHealth research. It has been active for the past three years and the group consists of UCSC staff who are professionals on ICT and external medical consultants with expert knowledge on the domain of health. Their projects include telemedicine (Vidusuwa), communicable disease surveillance (Nivarana), ICU bed integration (Sathkaara), an eHealth eLearning portal (saukya.lk) and many other research and development on image processing and ayurvedic solutions. This group has many publications in IEEE and other recognized international conferences and has also won other international awards.

eSwabhimi Award for best e-Content for eHealth in Sri Lanka in 2009 and the Manthan Award for best eContent in South Asia for eHealth in 2009. Vidusuwa was also selected by the NBQSA (National Best Quality Software Awards in Sri Lanka) to represent Sri Lanka in the field of eHealth in the International APICTA (Asia Pacific ICT Alliance Awards) in 2010 in Malaysia.

e-Learning Research Group

Research and development work of e-Learning was started when the UCSC was formed in 2002. Since this work was very important for the development and sustainability of UCSC, a separate centre was established as the e-Learning Centre (e-LC) to promote research work in addition to providing e-Learning services to its degree programmes. Sida (Swedish International Development Agency)
gave a planning grant to UCSC to initiate this work in 2002. Later, a comprehensive project was started in 2006 to carry out research and development study in e-Learning to contribute to the national development in Sri Lanka. Under this project, three staff members started their doctoral studies based on e-Learning in collaboration with Swedish Universities and several other students started local MPhil degrees in e-Learning. E-learning research work covers basically four sectors of education, namely higher education, school education, community education and professional education. This research group especially considers how ICT infrastructure and facilities can be enhanced and integrated to provide e-Enabled learning environments. During last five years, more than 50 research papers have been published in international conferences and journals by this research group.

**Game Based Learning**

Game based learning is one of the most recent teaching methodologies, which provides a virtual learning environment to the students. This research group is involved in creating virtual learning environments to provide the opportunities for the students to learn by experience. It is a well-known fact that, learning by experience is more efficient than learning by studying. The students get the opportunity to make observations depending on the experiments in an imaginary world through such approaches, rather than studying the theory and imagining what would happen. This innovative education paradigm called “Game based learning” helps the students of various age levels to enhance their learning processes.

**Geographic Information System (GIS) Research Group**

The Geographic Information System (GIS) research group at UCSC works on contemporary geospatial technologies with the aim of enhancing existing GIS solutions and developing new geospatial solutions. The main emphasis of the research group is on Location Based Services (LBS) and on the use of remotely sensed data to develop algorithms and techniques to identify different types of land parcels and their characteristics to improve resource management. The group also does research on using satellite data to improve the accuracy of existing vector data.

**Language Technology Research Laboratory**

The Language Technology Research Laboratory undertakes research and consultancy in tasks which require natural language processing and text mining technology. Current research in the lab include developing human quality Text to Speech systems for Sinhala and Tamil, a Sinhala speech recognition engine and an optical character recogniser for Sinhala. It also is assisting in the making of the National Sinhala encyclopaedia accessible and usable online. Past research included building linguistics resources for Sinhala and Tamil, improving Sinhala-Tamil machine translation and developing linguistic tools such as spell checkers for public use. Our activities can be found at ltrl.ucsc lk, while our public portal for tools is at subasa.lk.
Modeling and Simulation Group

This group focuses on mathematically modeling certain physical systems using the laws of physics and building simulators to allow users to interact with the virtual worlds so created. A ship handling simulator, Vidusayura, is the flagship project of this group. It was developed in collaboration with the Sri Lanka Navy. Vidusayura is currently used by the Sri Lanka Navy on an experimental basis. Other current projects include an artillery simulator and a ground vehicle simulator to train novice users.

Social Life Networks

This group aims to provide real-time information to support activities related to livelihood, delivered using mobile phone applications targeted to meet the needs of people in developing countries. This research is carried out as an international collaborative research program. The group currently focusses on applications in the areas of agriculture to harness the rich information available in social networks, public data sources including spatio-temporal sensor data as well as the emerging cloud infrastructure.

Sustainable Computing Research (SCoRe) Group

The Sustainable Computing Research Group (SCoRe) at UCSC has conducted research covering various aspects of wireless sensor networks, embedded systems, digital forensics, information security, mobile applications and e-learning. The goal of their research is to generate computing solutions through identifying low cost methodologies and strategies that lead to sustainability.

At present, the SCoRe group is at a stage of its evolution in which it has been able to secure high donor confidence as evidenced by no less than five simultaneous foreign funded projects underway since 2005. SCoRe group has been a pioneer in cooperating with Internet Society (ISOC), Swedish Agency for International Development Cooperation (Sida)/The Department for Research Cooperation (SAREC), The Swedish Program for Information and Communication Technology in Developing Regions (Spider) and Information Society Innovation Fund (ISIF) in the area of computer science by establishing several interesting ICT research projects. These projects are considered to be the benchmarks of such projects in the world.

Vehicular sensor network which is called BusNet, multiseat computer which is called PokuruPC and a forensic investigation toolkit were their big successes which received wide international acceptance.

Embedded Systems

This research group focuses on practical embedded systems such as microcontroller applications, IoT systems, and robotic systems, as well as theoretical aspects related to embedded systems such as power consumption, timing, communication, localization, and verification. It has infrastructure facilities attached to the electronics lab of UCSC.
AWARDS WON BY UCSC

• NSF Technology Award of Excellence was won by UCSC for the project “ViduSayura: The three dimensional coastal surveillance system” in 2017.

• UCSC won three awards in three categories “m-Content”, “Inclusion & Empowerment”, and “Culture & Tourism” at “e-Swabhimani Awards 2016” organized by the ICTA in 2016.

• Simultaneously Team WhileLoop of UCSC was awarded as the Champions of the Janashakthi Full Option Appathon Challenge 2016.

• The Hiran Tillekeratne Research Fund 2011 Award for Outstanding Postgraduate Research in Information Technology was presented to Mr. K D Sandaruwan for his postgraduate research work carried out during the 2009-2011.

• At e-Swabhimani 2010, UCSC won in three categories and was also awarded certificates for two other projects.
• UCSC staff won Gold and Bronze at NBQSA e-Health and Education & Training categories for the project Run Tropica (collaboratively done with University of Monash, Malaysia) and K-8 Flight Simulator (collaboratively done with CRD Ministry of Defense).

• The UCSC Theekshana Company was presented the e-Swabhimani 2010 award for the Birth, Marriage and Death Certificates Digitization Project under e-Government 2010 category.

• Language Technology Research Laboratory of the UCSC was awarded the e-Swabhimani 2010 award for the Subasa Project under the e – Inclusion category.

• UCSC student project Nivarana was awarded the e-Swabhimani 2010 award under the e-Health category.

• UCSC was also awarded a Certificate of Special Merit for the Shikshaka project of the Language Technology Group and a Certificate of Appreciation for the VLE Open Learning project of the e-Learning Centre. Both awards were under e-learning and Education category.

• Two gold awards for overall performance and for the Research and Development category of the National Best Quality ICT was won by UOC staff for the SIYARA harbor VTMS (New Dimension in Port Traffic Management) in 2013.

• A gold award was won by Praneeth Nilanga Peiris; Milan Harindu perera; Milindu Sanoj Kumarage; Dhanushka Chandana of University of Colombo School of Computing in 2014.

• UCSC staff won the best paper award for the project; “Eloc: Locating Wild Elephants using Low-cost Infrasonic Detectors at the Conference on Distributed Computing in Sensor Systems (DCOSS) in 2017.”
MASTER OF COMPUTER SCIENCE/
MASTER OF SCIENCE IN COMPUTER SCIENCE
INTRODUCTION

DURATION
Two academic years part-time consists of four semesters (up to 15 weeks per semester

LECTURES
Lectures: Fridays 5.30 - 7.30 pm and Saturdays 8.30 am – 5.45 pm
Lectures and Practicals: Sundays

ENTRY QUALIFICATION
1. A degree in computing from a University or an Institution recognized by the UGC
or,
2. Any other academic or professional qualification judged equivalent to a degree in Computing by the Senate of the University of Colombo.

ADMISSION
The selection process consists of a written test followed by an interview

CREDIT TABLE

<table>
<thead>
<tr>
<th>Course/Subject Description</th>
<th>Credit Value</th>
<th>Direct Staff-Student Contact Hours</th>
<th>Notional Hours (direct staff-student contact hours and independent learning)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lecture course</td>
<td>1</td>
<td>15</td>
<td>50</td>
</tr>
<tr>
<td>Laboratory course</td>
<td>1</td>
<td>30</td>
<td>50</td>
</tr>
<tr>
<td>Individual project</td>
<td>5</td>
<td>Variable</td>
<td>500</td>
</tr>
<tr>
<td>Individual research project</td>
<td>15</td>
<td>Variable</td>
<td>1500</td>
</tr>
</tbody>
</table>

One credit is considered equivalent to 50 notional learning hours for a taught course and laboratory course. In the case of project work/ Independent Studies, one credit is considered equivalent to a minimum of 100 notional hours.
STRUCTURE OF THE PROGRAMME

The programme has a number of course units and each course will carry a specified number of credits. Module descriptors for each course are available on VLE. First two semesters compulsory and third semester optional.

Semester 1:
In the first semester of the Programme, the following core/compulsory course units shall be offered

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>MCS1201</td>
<td>Advanced Algorithms</td>
<td>3</td>
</tr>
<tr>
<td>MCS1202</td>
<td>Advanced Software Engineering</td>
<td>3</td>
</tr>
<tr>
<td>MCS1203</td>
<td>Advanced Database Systems</td>
<td>3</td>
</tr>
</tbody>
</table>

**MCS1201 Advanced Algorithms 3 Credits**

**MCS1202 Advanced Software Engineering 3 Credits**

**MCS1203 Advanced Database Systems 3 Credits**
- Database Integrity, Transaction Management and Recovery, Concurrency, Distributed Databases, Query Processing and Optimistic Databases, Emerging Technologies: Data Warehousing, XML and Internet Databases, Object-Relational Databases, Emerging Trends
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>MCS1204</td>
<td>Selected Topics in Computer Science</td>
<td>2</td>
</tr>
<tr>
<td>MCS1205</td>
<td>Principles of Programming Languages</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Introduction, Evaluation Criteria for Languages, Language Implementation Methods, Syntax and Semantics, Lexical and Syntax Analysis, Data Types, Names, Bindings, Type Checking and Scope, Language Expressions and Assignments, Control Statements, Subprograms, Object Orientation Support in Languages, Exceptions and Event Handling, Introduction to Lambda Calculus, Functional Programming Language Fundamentals, Emerging Trends</td>
<td></td>
</tr>
</tbody>
</table>

**Semester 2:**

In the second semester of the Programme, the following core/compulsory course units shall be offered

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>MCS2201</td>
<td>Information Systems Security</td>
<td>3</td>
</tr>
<tr>
<td>MCS2202</td>
<td>Advanced Concepts in Data Communications Networks</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Introduction, Channel Characterization, TCP/IP Stack, IP Addressing, IP Support Protocols; Multi-access Protocols: Static and Dynamic Channel Allocation, CSMA, CSMA/CA, CSMA/CD, FDMA and TDMA; Routing: IPv6, OSPF, RIP, BGP, MPLS, Multicast (DVMRP, etc.), key based (DHT); End to End Issues: TCP and Congestion Control and QoS; Data Centre Design and Virtualization, SDN Concepts; CDMA, MANETS, IoT, Vehicular Ad Hoc Nets; Network Simulation (NS, Mininet), Emerging Trends</td>
<td></td>
</tr>
</tbody>
</table>
MCS2203  Data Analytics & Machine Learning  3 Credits

Data Mining: Introduction to Data Mining, Knowledge Extraction Process, Data Pre-processing, Frequent Itemsets Mining, Association Rule Mining, Classification and Cluster Analysis, BI Tools and Application, Overview of Big Data Analytics; Data Warehousing: Introduction to Data Warehouse, Data Warehouse Architecture, Multidimensional Data Model, Concept Hierarchies, Attributes Generalization and Relevance, Online Analytical Process, Business Intelligence (Tools and Visualization); Machine Learning: Supervised Learning, Unsupervised Learning, Ensemble methods, Overview of Deep learning, Natural Algorithm and Reinforcement Learning, Emerging Trends.

MCS2204  Theoretical Computing  2 Credits

Mathematical Preliminaries, Strings and Languages, Recursive Definition of Sets, Finite Specification of Languages, Regular Sets, Regular Expressions, Deterministic Finite State Automata (DFA), Nondeterministic Finite State Automata (NFA), Construction of Equivalent DFA of a Given NFA, Equivalence of DFA, NFA, and Regular Expressions, Closure Properties of Regular Languages, Myhill - Nerode Theorem as Characterization of Regular Languages, and States Minimization of DFA, Context-Free Grammars (CFG) and Languages Generated, Regular Grammar, and Equivalence of Regular Grammar and Finite State Automata, Ambiguity of CFG and Normal forms of CFG, Pushdown Automata (PDA) and its variations, Turing Machines, Generalized Versions of Turing Machines, Decidability and Recognizability, Decision Problems and the Church – Turing Thesis, Encoding of Turing Machines and the Halting Problem for Turing Machines, Universal Turing Machine, Reducibility, Rice’s Theorem; Decidability of Membership, Emptiness, and Equivalence Problems of Languages.

Semester 3:

Note:

• The Individual Research Project carried out by the candidates following Master of Science in Computer Science and the Individual Project carried out by Master of Computer Science candidates continues to fourth semester.

• The Research Methods course is compulsory for candidates following the Master of Science in Computer Science Degree Programme.
In the third semester of the Programme, the following core/compulsory courses shall be offered:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>MCS3201</td>
<td>Intelligent Systems</td>
<td>3</td>
</tr>
<tr>
<td>MCS3202</td>
<td>Systems Modelling &amp; Simulation</td>
<td>3</td>
</tr>
<tr>
<td>MCS3203</td>
<td>Individual Research Project</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td>This course unit aims to enhance the capacity of candidates to advance their knowledge, investigative skills and other skills to explore new knowledge within the field of computer science which in turn form the basis for academic advancement and technological development. A candidate specializes an area within the field of computer science and hence, should demonstrate a critical awareness of current issues and recent developments within the area of specialization. This course requires a high level of theoretical engagement, critical analysis and evaluation with respect to the research work carry out. The major expectations of this course unit are: conduct a comprehensive research work in the field of computer science with a substantial research contribution; construct hypotheses in the area of specialization and test them in a scientific manner; conduct a relevant background study with a critical analysis of related scientific work and evaluate current research in the area of specialization to clearly demonstrate the awareness of the broader context of the problem; formalize arguments logically and, employ these arguments to make sound judgements and to conclude a research solution scientifically; conduct a critical evaluation of the research which clearly demonstrates the technical quality and research merit; by following proper academic writing standards, submit a dissertation and a research paper based on the research outcome which is evaluated and accepted; demonstrate the work at the oral examination.</td>
<td></td>
</tr>
</tbody>
</table>
MCS3204 Individual Project 5 Credits

The aim of this course unit is to enhance the intellectual capacity of candidates to advance their knowledge and investigative skills, and other abilities relevant to computer science, forming the basis for academic advancement and technological capacity. This includes the development of an innovative software application with a research component. The major expectations of this course unit are: conduct a relevant background study with a critical analysis of similar systems and applications to clearly demonstrate a comprehensive level of knowledge and understandability of the broader context of the problem; critically analyze data, make judgments to evaluate the system to clearly demonstrate the technical quality and innovativeness; demonstrate the findings in a dissertation which will be evaluated and accepted; demonstrate the work at the oral examination.

In the third semester of the Programme, the following optional courses shall be offered:

MCS3205 Distributed Systems 3 Credits


MCS3206 Advanced Computer Graphics and Gaming 3 Credits


MCS3207 Bioinformatics 2 Credits

Introduction to Bioinformatics: Bioinformatics, Applications and Challenges, Types of Biological data – DNA, RNA, Amino Acid and Protein, Molecular Biology: Central Dogma, Archives and Information Retrieval, Genome Organization and Evolution, Sequence Alignment, Phylogeny: Phylogenetics Basics, Multiple Sequence Alignment, Gene Expression and Regulation, Structural Bioinformatics and Drug Discovery, Systems Biology: Metabolic Pathways, Dynamics of Metabolic Pathways.
### MCS3208  Research Methods  2 Credits

Science, Scientific Method, and Research; Research Philosophies, e.g. Positivism, Subjectivism, Interpretivism, Pragmatism, Critical Realism; Approaches to Theory Development: Induction, Deduction, Abduction; Types of Research and Selecting/Defining a Research Problem, Defining Research Aims, Questions and Objectives; Conducting a Literature Review, Referencing & Referencing Styles, Research Onion; Research Strategies: Experiments, Case Studies, Action Research, Survey, Ethnography; Method Choices; Time Horizons; Credibility of Findings; Research Ethics and Integrity; Publishing.

### Semester 4:

In the fourth semester the following two compulsory courses shall be offered:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>MCS4201</td>
<td>Cognitive Systems</td>
<td>2</td>
</tr>
<tr>
<td>MCS4202</td>
<td>Embedded Systems</td>
<td>2</td>
</tr>
</tbody>
</table>

### MCS4201  Cognitive Systems  2 Credits


### MCS4202  Embedded Systems  2 Credits

In the fourth semester of the Programme, the following optional courses shall be offered:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>MCS4203</td>
<td>Image Processing and Vision</td>
<td>2</td>
</tr>
<tr>
<td>MCS4204</td>
<td>Software Project Management and Quality Assurance</td>
<td>3</td>
</tr>
<tr>
<td>MCS4205</td>
<td>Natural Algorithms</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Introduction; Sorting, Shortest Path, Travelling Salesman Problem; Evolutionary Computing: Genetic Algorithms (GA), Genetic Programming (GP), Genetic Based Machine Learning (GBML); Swarm Intelligence: Particle Swarm Optimization (PSO); Foraging Algorithms: Ant Colony Optimization (ACO), Bees Algorithm (BA), Cockroach Algorithm (CA); Artificial Immune Systems (AIS), Emerging Trends.</td>
<td></td>
</tr>
<tr>
<td>MCS4206</td>
<td>Mobile Computing</td>
<td>3</td>
</tr>
<tr>
<td>MCS4207</td>
<td>Enterprise Web Architecture</td>
<td>2 Credits</td>
</tr>
<tr>
<td>---------</td>
<td>-----------------------------</td>
<td>-----------</td>
</tr>
</tbody>
</table>

MASTER OF INFORMATION TECHNOLOGY
INTRODUCTION

DURATION
Two academic years part-time consists of four semesters (up to 15 weeks per semester)

LECTURES
Lectures: Fridays 5.30 - 7.30 pm and Saturdays 8.30 am – 5.45 pm
Lectures and Practicals: Sundays

ENTRY QUALIFICATION
1. A Degree from a University or Institution recognized by the UGC;
   or
2. Any other academic or professional qualification, which is deemed equivalent to a Degree by the Senate of the University of Colombo on the recommendation of the School.

ADMISSION
The selection process consists of a written test followed by an interview.

GUIDELINES FOR THE VOLUME OF LEARNING

<table>
<thead>
<tr>
<th>Course/Subject Description</th>
<th>Credit Value</th>
<th>Direct Staff-Student Contact Hours</th>
<th>Notional Hours (direct staff-student contact hours and independent learning)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lecture course</td>
<td>1</td>
<td>15</td>
<td>50</td>
</tr>
<tr>
<td>Laboratory course</td>
<td>1</td>
<td>30</td>
<td>50</td>
</tr>
<tr>
<td>Individual Project/Independent Study</td>
<td>5</td>
<td>Variable</td>
<td>500</td>
</tr>
</tbody>
</table>

One credit is considered equivalent to 50 notional learning hours for a taught course and laboratory course. In the case of project work/ Independent Studies, one credit is considered equivalent to a minimum of 100 notional hours.
STRUCTURE OF THE PROGRAMME

The programme has a number of courses and each course will carry a specified number of credits. Module descriptors for each course is available on VLE.
First and second semesters consist of compulsory courses while third and fourth semesters consist of both compulsory and optional courses.

Semester 1:
The following 4 core courses shall be offered.

**MIT1201  Program Design and Programming  3 Credits**

Basic Syntax and Semantics of Higher Level Programming Languages; Control Structures and Related Problem Solving Activities; Functions and Parameter Passing, Structured Programming Concepts and Recursive Problem Solving; Primitive Data Types, Arrays, Records, Tuples, Dictionaries, etc. and Basic String and String Processing, Design, Implementation, Testing and Debugging; Data Representation in Memory, Pointer Based and Reference Based Implementation, Linked List Data Structures and Application; Hash Functions, Stack and Queue Applications; Graphs and Trees Traversals Techniques and Applications; Sorting Algorithm Families and their Running Times, Advanced Sorting Algorithms, Searching Algorithms, Time Complexity.

**MIT1202  Computer Systems  3 Credits**

Data Representation – Numbering Systems, Positive / Negative Number Representation, Floating Point Number Representation; Logic Operations - Basic Logic Operators and Logic Gates, Basic Logic Circuit Design, Combinational Logic, Sequential Logic; Inner Workings of the CPU- Components of a CPU, Specifications, Instruction Set Architecture, Fetch and Execution Cycle; Memory Components and Organization - Types of Memory, Memory Hierarchy, Cache Memory and Mapping Schemes, Virtual Memory, Measuring Memory Performance.

**MIT1203  Database Management Systems  3 Credits**

Introduction to Database Management Systems, Relational Data Model, Conceptual Design (ER Concepts and Terminology), Logical Design, Structured Query Language (SQL), and Data Normalization Process and the Normal Forms.
MIT1204 Systems Analysis and Modelling 3 Credits


Semester 2:
The following five core courses shall be offered.

MIT2201 Computer Networking 3 Credits


MIT2202 Software Engineering 2 Credits


MIT2203 Data and Network Security 3 Credits

### MIT2204 Agile Software Development 3 Credits


### MIT2205 IT Innovation 2 Credits

Theoretical perspectives, best practices in IT innovation, creative problem solving and strategies, impact of technological innovations on the economy and society, innovation skills needed for today’s dynamic, global, and technology-enabled competitive environment, successful innovative product, commoditization of IT, strategic importance of the web as a platform, information organization, searching for knowledge, introduction to relevant tools and libraries, economics of digital goods and services, knowledge management in the corporate sector, challenges to innovation, disruptive innovation, managing, guiding, facilitating, nurturing the innovative ideas, solutions in software development organizations.

### Semester 3:

(A). The following compulsory course shall be offered in the semester 3

<table>
<thead>
<tr>
<th>MIT3201 Individual Project 5 Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>This course unit aims to enhance the capacity of candidates to develop project proposals and apply appropriate software engineering principles and adopt a suitable software development life cycle to develop an innovative application. This includes the analysis, design and development of a software application. The major expectations of this course unit are: conduct in relevant domain analysis to identify the requirements in order to address the problem and study similar systems and technologies; document the analysis, design and development (implementation) of the software solution; conduct an evaluation of the system which clearly demonstrates the technical quality using user evaluation and application of relevant quality assurance processes including the use of testing tools; submit a dissertation which will be evaluated and accepted; demonstrate the work at the oral examination.</td>
</tr>
</tbody>
</table>
(B). The following five optional courses shall be offered

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>MIT3202</td>
<td>Project Management &amp; Professional Issues in IT</td>
<td>2</td>
</tr>
<tr>
<td>MIT3203</td>
<td>The Foundations of e-Learning</td>
<td>2</td>
</tr>
<tr>
<td>MIT3204</td>
<td>Data Mining and Warehousing</td>
<td>3</td>
</tr>
<tr>
<td>MIT3205</td>
<td>User Interface Design</td>
<td>3</td>
</tr>
</tbody>
</table>

**MIT3202 Project Management & Professional Issues in IT 2 Credits**

Professional Issues in IT - ethical theories, professionalism and professional organizations, from theory to implementation; project management - introduction to project management, project integration, scope, time, cost management, IT project quality and communications management, project human resource management, financial calculations for project appraisals.

**MIT3203 The Foundations of e-Learning 2 Credits**

e-learning theories and concepts - learning theories, from learning to e-learning, technologies, rules and standards for e-learning; planning and managing e-learning projects - planning e-learning, managing e-learning, evaluating e-learning; design and development of e-learning objects - instructional design methodology, developing e-learning content, delivering e-learning courses, emerging trends.

**MIT3204 Data Mining and Warehousing 3 Credits**

Introduction to data mining, data warehouse and olap, data preprocessing, data mining knowledge representation, data mining algorithms, data mining algorithms: classification, evaluation techniques, data mining algorithms: clustering, advanced techniques, emerging trends.

**MIT3205 User Interface Design 3 Credits**

Introduction, human factors - human perception and graphic design, human visualization, system colour theory and design principles, typography; design theory - elements of design, principles of design guidelines; evolving rich interaction - animation and video technology, multimodal technology; ui requirements - pact analysis, persona and scenario, task analysis; user-centre design - task design and help documentation, user assessment, UI software architectures; principles and heuristics of usability; prototyping, emerging trends.
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>MIT3206</td>
<td>Mobile Computing</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Introduction, operating systems for</td>
<td></td>
</tr>
<tr>
<td></td>
<td>wireless mobile devices, android</td>
<td></td>
</tr>
<tr>
<td></td>
<td>overview and android development</td>
<td></td>
</tr>
<tr>
<td></td>
<td>environment, anatomy of an android</td>
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<tr>
<td></td>
<td>app and the app lifecycle,</td>
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</tr>
<tr>
<td></td>
<td>applications development for android</td>
<td></td>
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<tr>
<td></td>
<td>devices with android studio,</td>
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<tr>
<td></td>
<td>android user interface, android</td>
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<tr>
<td></td>
<td>intents &amp; android persistence,</td>
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<td></td>
<td>android web view &amp; web services,</td>
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<tr>
<td></td>
<td>android animation and graphics,</td>
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<tr>
<td></td>
<td>location-based apps, sensing and</td>
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<tr>
<td></td>
<td>sensors, hybrid mobile app development</td>
<td></td>
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<tr>
<td></td>
<td>native mobile app development,</td>
<td></td>
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<tr>
<td></td>
<td>mobile testing, mobile security.</td>
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</tr>
</tbody>
</table>

**Semester 4:**

(A). The following 4 optional courses shall be offered

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>MIT4201</td>
<td>Software Quality Assurance</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Introduction, software quality</td>
<td></td>
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<tr>
<td></td>
<td>factors, the components of a</td>
<td></td>
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<tr>
<td></td>
<td>Software Quality Assurance (SQA)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>system (pre-project components,</td>
<td></td>
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<tr>
<td></td>
<td>project life-cycle components</td>
<td></td>
</tr>
<tr>
<td></td>
<td>including the design, development</td>
<td></td>
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<tr>
<td></td>
<td>and maintenance stages,</td>
<td></td>
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<tr>
<td></td>
<td>infrastructure components,</td>
<td></td>
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<tr>
<td></td>
<td>managerial aspects and human</td>
<td></td>
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<tr>
<td></td>
<td>resource perspectives, standards,</td>
<td></td>
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<tr>
<td></td>
<td>certification and assessment)</td>
<td></td>
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<tr>
<td></td>
<td>software testing - strategies and</td>
<td></td>
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<tr>
<td></td>
<td>implementation, software test</td>
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<tr>
<td></td>
<td>automation (Selenium, TestNG, JUnit)</td>
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</tr>
<tr>
<td></td>
<td>JMeter and Fire Fly) introduction</td>
<td></td>
</tr>
<tr>
<td></td>
<td>to test automation frameworks and</td>
<td></td>
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<tr>
<td></td>
<td>paradigms, testing mobile</td>
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<tr>
<td></td>
<td>applications (of Appium) continuous</td>
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<tr>
<td></td>
<td>integration and build tools,</td>
<td></td>
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<tr>
<td></td>
<td>performance testing, and new</td>
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<tr>
<td></td>
<td>trends in quality assurance.</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>MIT4202</td>
<td>IT Strategy and Policy</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Policies in information domain -</td>
<td></td>
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<tr>
<td></td>
<td>privacy and security policy, COBIT</td>
<td></td>
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<tr>
<td></td>
<td>5 and IT strategies, Val IT and GET</td>
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<tr>
<td></td>
<td>IT, IT frameworks and models,</td>
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<td></td>
<td>emerging trends.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>MIT4203</td>
<td>Business Statistics and Operational Research</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Basic Statistics - Introduction to</td>
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<tr>
<td></td>
<td>Statistics and Data Collection</td>
<td></td>
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<tr>
<td></td>
<td>Techniques, Graphical Representation</td>
<td></td>
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<td></td>
<td>of Data, Numerical Representation of</td>
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<tr>
<td></td>
<td>Data, Introduction to Probability,</td>
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<tr>
<td></td>
<td>Random Variables, Basic Probability</td>
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<tr>
<td></td>
<td>Distributions, Hypothesis Testing,</td>
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<tr>
<td></td>
<td>Analysis of Variance, Correlation</td>
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<tr>
<td></td>
<td>and Regression Analysis; Operational</td>
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<tr>
<td></td>
<td>Research - Introduction, Graphical</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Method, Simplex Method, Transportation</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Problems, Assignment Problems,</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Statistical Software Tools</td>
<td></td>
</tr>
</tbody>
</table>
MIT4204  e-Business Applications and Strategies  3 Credits


The syllabus applicable to each course shall be prescribed by the school from time to time and as approved by the Academic Syndicate.
MASTER OF INFORMATION SECURITY
INTRODUCTION

DURATION
Two academic years part-time consists of four semesters (up to 15 weeks per semesters)

LECTURES
Lectures: Week Days 5.30 - 7.30 pm and Saturdays 8.30 am – 5.45 pm
Lectures and Practicals: Sunday

ENTRY QUALIFICATION
1. A Degree from a University or an Institution recognized by the UGC;
or
2. Any other academic or professional qualification, which is deemed equivalent to a Degree by the Senate of the University of Colombo on the recommendation of the School.

ADMISSION
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<th>Notional Hours (direct staff-student contact hours and independent learning)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lecture course</td>
<td>1</td>
<td>15</td>
<td>50</td>
</tr>
<tr>
<td>Laboratory course</td>
<td>1</td>
<td>30</td>
<td>50</td>
</tr>
<tr>
<td>Individual Project/Independent Study</td>
<td>5</td>
<td>Variable</td>
<td>500</td>
</tr>
</tbody>
</table>

One credit is considered equivalent to 50 notional learning hours for a taught course and laboratory course. In the case of project work/Independent Studies, one credit is considered equivalent to a minimum of 100 notional hours.
STRUCTURE OF THE PROGRAMME

The programme has a number of courses and each course will carry a specified number of credits. Module descriptors for each course is available on VLE.

All four semesters consist of compulsory courses.

Semester 1:
The following 4 core courses shall be offered.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>MIS1201</td>
<td>Principles of Information Security</td>
<td>3</td>
</tr>
<tr>
<td>MIS1202</td>
<td>Cryptographic Systems</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Cryptography overview, one-way functions, pseudo-randomness, hash functions, symmetric encryption, authentication systems, public-key encryption systems, digital signature schemes, Interactive Proofs, Elliptic curve cryptosystems, Cryptographic protocols such as zero-knowledge protocols and e-voting, two-party secure computation, multiparty secure computation, and chosen-ciphertext security, Quantum Cryptography</td>
<td></td>
</tr>
<tr>
<td>MIS1203</td>
<td>Information Risk Management and Audit</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Operative risk, Risk tolerance and risk appetite, Risk analysis and vulnerability assessment, Cost/benefit analysis, Communicating risk and developing risk metrics, Identifying risk mitigations, Acceptance Criteria, Internal Control</td>
<td></td>
</tr>
<tr>
<td>MIS1204</td>
<td>Network Security</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Network authentication, Web security protocols such as SSL, VPN technology (IPSec), Security in IPV6 networks, Firewalls, Security in Web services, Intruder Detection and Prevention, DNS security</td>
<td></td>
</tr>
</tbody>
</table>
### MIS1205 Special Topics in Information Security 2 Credits

Minimum of ten (10) and maximum of fifteen (15) seminars will be conducted in the first semester.

- Students shall submit assignments as a part of continuous assessment.

### Semester 2:

The following five core courses shall be offered in the second semester of the programme of study:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>MIS2201</td>
<td>Database Security</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Introduction to Database Security, Database Authentication, Discretionary Access Control, Role Based Access Control, Mandatory Access Control, Security threats with respect to SQL injections, Database Inference, Virtual Private Databases (VPD), Security in Statistical Databases, Encryption mechanisms in Databases, Database Auditing.</td>
<td></td>
</tr>
<tr>
<td>MIS2202</td>
<td>Digital Forensics</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Types of computer crime, Computer misuse, Data protection, Criminal damage, Software piracy, Forgery, Pornography, Unsuitable material, Cybercrime methodologies, Computer forensic investigative theory, Computer forensic processing techniques, File system forensic, Forensic network investigations, Linux for forensic analysis, Linux forensic tools, Forensic investigation on mobile devices</td>
<td></td>
</tr>
<tr>
<td>MIS2203</td>
<td>Security in Mobile and Wireless Networks</td>
<td>3</td>
</tr>
<tr>
<td>MIS2204</td>
<td>Data Mining for Information Security</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Introduction to data mining, Concepts and methods, Major data mining methods: Data generalization, characterization, association, classification, clustering, and outliers analysis techniques, Stream data processing and stream data mining, Data mining for intrusion detection, Privacy-preserving data mining, Protection of information security in data mining</td>
<td></td>
</tr>
<tr>
<td>Course Code</td>
<td>Course Title</td>
<td>Credits</td>
</tr>
<tr>
<td>------------</td>
<td>--------------------------------------------------</td>
<td>---------</td>
</tr>
<tr>
<td>MIS1205</td>
<td>Special Topics in Information Security</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Continuation of the course in the first semester</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Minimum of ten (10) and maximum of fifteen (15) seminars will be conducted in the second semester.</td>
<td></td>
</tr>
</tbody>
</table>

**Semester 3:**

The following four compulsory courses shall be offered in the third semester of the programme of study.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>MIS3201</td>
<td>Information and Coding Theory</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Entropy, Data Compression such as the Kraft inequality, Channel Capacity, Error Control Coding, Advanced Coding Techniques such as lattice codes, trellis coded modulation, coset codes, multi-level codes/multi-stage decoding, iterative decoding</td>
<td></td>
</tr>
<tr>
<td>MIS3202</td>
<td>Secure Software Systems</td>
<td>3</td>
</tr>
<tr>
<td>MIS3203</td>
<td>Information Security Governance</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Principles for information security practitioners, Information security management practices, with focus on governance, Business Model for Information Security (BMIS), with case studies, Threats, Compliance, Security Controls, Information security governance with case study, Security Policy, Industry best practices, Business Continuity</td>
<td></td>
</tr>
<tr>
<td>MIS3204</td>
<td>Incident Management</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Types of Computer Security Incidents, responding to various types of malicious activity such as the use of rootkits, botnets and distributed denial of service attacks, responding to insider threats and attacks, handling major computer security events and incidents, Incident management concepts, Scope and charter of incident management, Incident management objectives, Incident management metrics and indicators, Defining incident management procedures, Incident management resources, incident response capability, Elements of an incident response plan, Developing response and recovery plans, Testing response and recovery plans, Executing response and recovery plans, Documenting events, Post incident reviews</td>
<td></td>
</tr>
</tbody>
</table>
Masters Programmes 2017-18

Semester 4:
The following three compulsory courses shall be offered in the fourth semester of the Programme of Study:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>MIS4201</td>
<td>Cyber Security and Law</td>
<td>3</td>
</tr>
<tr>
<td>MIS4202</td>
<td>Multimedia Security and Digital Rights Management</td>
<td>3</td>
</tr>
<tr>
<td>MIS4203</td>
<td>Independent Studies in Information Security</td>
<td>5</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>MIS4201</th>
<th>Cyber Security and Law</th>
<th>3 Credits</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>MIS4202</th>
<th>Multimedia Security and Digital Rights Management</th>
<th>3 Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overview of multimedia contents dissemination and digital storage, digital rights management systems and technical trends, Steganography, Digital watermarking, Frequency domain based watermarking, Video watermarking, Multimedia quality measurements and enhancements, Watermarking and their vulnerabilities, examples of media protection schemes: CSS, CGMS, HDCP, Emerging DRM Standards</td>
<td></td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>MIS4203</th>
<th>Independent Studies in Information Security</th>
<th>5 Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Independent studies in Information Security should result in laboratory reports or log forms. Minimum of ten (10) and maximum of fifteen (15) independent studies in Information Security will be given under this course.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- The Independent Studies in Information Security in the fourth semesters of the programme shall consist of minimum of ten (10) studies and maximum of fifteen (15) studies which solve the given set of problems and submission of a report based on the solutions to the problems.

- Each student who undertakes Independent Studies in Information Security should submit a report based on the solutions to the problems together with Log Forms at the end of the fourth Semester. An oral examination on this report will be held.

- Students shall submit Assignments as a part of Continuous Assessment.
MASTERS PROGRAMMES

UCSC mainly offers four masters degrees namely,

- Master of Computer Science (MCS) - The Master of Computer Science (MCS) is designed for Computing graduates who wish to enhance their knowledge in Computer Science.

- Master of Science in Computer Science (MSc in CS) - The students those who are following the Master of Computer Science degree programme are able to register with the Master of Science in Computer Science degree based upon their academic performance. The Master of Science in Computer Science (MCS) is designed for computing graduates who wish to acquire a research-focused postgraduate qualification in Computer Science.

- Master of Information Technology (MIT) - The Masters in Information Technology is a programme targeted at graduates in disciplines other than computing or Information Technology who wish to pursue a career in an Information Technology related area.

- Master of Information Security (MIS) - The Master of Information Security Programme is designed for graduates who wish to acquire a postgraduate qualification in the area of Information Security. This Program offers mid-career opportunities for those working in the areas of information technology, information system audit and information security.

GRADING SYSTEM

The percentage score obtained in respect of each course of the degree programme shall be converted into a Grade according to the scheme given below:
Table 2. Grades & their Respective Grade Point Values

<table>
<thead>
<tr>
<th>Grade</th>
<th>Grade Point Value (GPV)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A+</td>
<td>4.25</td>
</tr>
<tr>
<td>A</td>
<td>4.00</td>
</tr>
<tr>
<td>A-</td>
<td>3.75</td>
</tr>
<tr>
<td>B+</td>
<td>3.25</td>
</tr>
<tr>
<td>B</td>
<td>3.00</td>
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<td>B-</td>
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<td>C+</td>
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<td>C</td>
<td>2.00</td>
</tr>
<tr>
<td>C-</td>
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</tr>
<tr>
<td>D+</td>
<td>1.25</td>
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<tr>
<td>D</td>
<td>1.00</td>
</tr>
<tr>
<td>D-</td>
<td>0.75</td>
</tr>
<tr>
<td>E</td>
<td>0.00</td>
</tr>
<tr>
<td>NC</td>
<td>0.00</td>
</tr>
</tbody>
</table>

Computation of Grade Point Average (GPA)
Computation of GPA is performed based on the formula given below

\[
GPA = \frac{\sum \text{GPV of compulsory course} \times \text{credit value of compulsory course} + \sum \text{GPV of required optional course (disregarding additional optional courses)} \times \text{Credit value of required optional course}}{\sum \text{credit value}}
\]
REPEATING A COURSE/ SUBJECT

- A student who obtains less than C grade after the evaluation of any course will be allowed to re-sit for the evaluation of that course provided that the course is offered. The higher mark of the reappearances will be taken into consideration.

COMPLETING A COURSE/SUBJECT

- An academic course and thus the corresponding number of credits applicable to that course is considered as ‘completed’ only if the student has received a Grade not inferior to a D grade after an evaluation of the Course.

- A student who fails or does not complete any course/subject in the first attempt will be eligible to repeat such course/subject in two attempts only. No further attempts shall be permitted to any student to sit for the course/Subject.

QUALIFYING FOR THE SECOND YEAR OF STUDY

Each student is initially registered for the corresponding Degree Programme. Such registration will be valid only for the first academic year (i.e. consecutive first and second semesters). It should be the duty and responsibility of the student to ensure that his/her registration continues to the second academic year (i.e. consecutive Third and Fourth Semesters) of the Degree Programme by paying the fees as specified by the school. In order to be registered for second academic year, each student should fulfil the following academic requirements:

- A Student who has obtained minimum of 2.00 GPA at the First and Second Semester Courses is eligible to follow the Third and Fourth Semester Courses.

- For the purpose of determining whether a student is eligible to progress to the Third and Fourth Semester, a student shall have secured a GPV of not less than 2.00 for Courses which add up or exceed 12 Credits in the First and/or Second Semesters.

A student who does not satisfy the academic qualifications given above to proceed to the second year of study should be re-registered for the first academic year by paying the prescribed fees.
QUALIFYING FOR THE MASTER OF SCIENCE IN COMPUTER SCIENCE

Since Master of Science in Computer Science degree is research-oriented, the student is required to obtain the following qualifications to be eligible for the Master of Science degree programme.

- Obtain a minimum GPA of 2.5 and
- Obtain a minimum GPV of 2.0 for the courses which add up or exceed 15 credits in the first and second semesters.

EXIT POINTS FROM THE DEGREE PROGRAMME

A student is able to make use of the following qualifications, to exit from the degree programme.

- Postgraduate Diploma
- Postgraduate Certificate

In order to obtain Postgraduate Diploma qualification, the student should fulfil the following academic requirements.

- he/she has obtained a GPV of not less than 2.00 for Courses which add up or exceed 25 credits;
- he/she has obtained a minimum of 2.00 of GPA;

In order to obtain Postgraduate Certificate qualification, the student should fulfil the following academic requirements.

- he/she has obtained a GPV of not less than 2.00 for Courses which add up or exceed 20 credits;
- he/she has obtained a minimum of 2.00 of GPA;

MINIMUM REQUIREMENT TO OBTAIN A DEGREE

The Master of Computer Science, Master of Information Security, Master of Information Technology

A Student who has satisfied the following conditions will qualify to obtain the corresponding masters degree

- not less than a GPV of 2.00 in the Courses which make up a minimum of 35 Credits;
- not less than a GPA of 2.00 for all the Courses which make up a minimum of 45 Credits; and
- not less than a C Grade (Pass) for the Independent Study/ Individual Project.
Master of Science in Computer Science Degree

A Student who has satisfied the following conditions will qualify to obtain the Degree of Master of Science in Computer Science.

- not less than a GPV of 2.00 in the Courses which make up a minimum of 50 Credits;
- not less than a GPA of 2.00 for all the Courses which make up a minimum of 60 Credits; and
- not less than a C Grade (Pass) for the Individual Research Project.

A student who has opted to follow the Master of Science in Computer Science degree programme is allowed to withdraw his/her registration from that programme, provided that he/she has obtained permission from the School for such a withdrawal. Instead, such student is permitted to obtain the Master of Computer Science degree subject to conditions applicable to that Degree programme.

DISTINCTION

- A student who has qualified for the award of the Degree by completing all the relevant requirements may be awarded Distinction if he/she has obtained GPA of not less than 3.50, provided he/she had completed the degree at the first attempt.

AWARDS

- Awards for academic performance in each programme
  - Academic Performance in the First Academic Year (Semester I and II) (ranked first and second)
  - Academic Performance in the Second Academic Year (Semester III and IV) (ranked first and second)
- Japan International Cooperation Agency (JICA) Award for the Best Student in Master of Information Technology
- Mr T. H. A. De Zoysa Award for the Best Student in Master of Science in Information Security
- Kingslake Award for the Best Student in Master of Computer Science
- Award for the best student in Master of Science in Computer Science
PROGRAMME ADMINISTRATION

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Project Coordinator (Individual Project)

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Project Coordinator (Individual Research Project)

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- Labs
- Office areas
- Student common areas
- Wash rooms
- Corridor

1-5 Lab A-E
6 NOC
7 Exam branch
8 Shroff Counter
9 Establishment branch
10 Finance branch
11 S104 Lecture hall