The Evolution of Information Science as a Discipline

How universities dealt with it globally and what Bangladesh can learn

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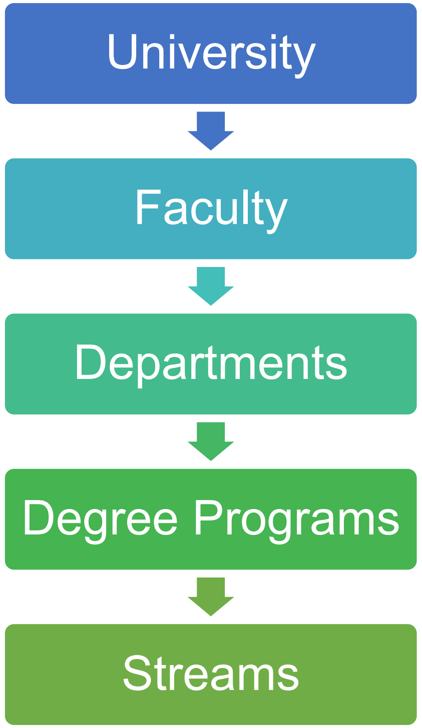
Background

- Existing literature captures how Information Science has historically evolved with time.

- However, there is little discussion on how **technological disruption** and **market needs** have influenced the educational institutions to roll out this pedagogical change across the globe in different timelines

Educational Institutions: Units of Observation in this Work



Issues Addressed around Information Science as an organized discipline

1. Historical Evolution with the changes of ICTs
2. The current global and regional trends
3. Emergence of ICTD
4. Brief situational analysis of how Bangladeshi Universities are responding

Study Methods and Coverage

Theme 1: Historical Evolution Based on secondary review of literatures and analyzing the historical information collected from selected university websites

Theme 2: Current Trends Data was analyzed to notice the similarities, as well as important differences or contradictions following these steps:

5 global regions including Asia, Australia, Europe, North and South America → **121** universities offering Information Science or related degrees → **7** types of faculty orientations offering these degrees → **10** emerging identified streams within these degree programs

Theme 3: Emergence of ICTD Additional Analysis on

28 independent ICTD degree programs and **6** types of identified faculty orientations offering these degrees

Theme 4: Bangladesh Situation Based on analysis of

15 different Universities across the country → **5** types of faculties → **33** degree programs → **3** identified components in the curriculum

The changes of ICTs: Key Highlights

Electronic Period
Approx. year 1940 - Present

Interventions were simultaneously happening around Europe and North America

- Automatic Sequence Controlled Calculator (It could perform the 4 basic Arithmetic operations)
- IBM (International Business Machines) (1st commercial Business computer) (1960s)
- Second generation computers (Used transistors) (1959-1965)
- Internet in 1960s
- Third generation computers (Used integrated circuits) (1965-1971)
- Mobile Phones (1G in 1973)
- Fourth generation computers (VLSI circuits enabled microcomputers) (1971-1980)
- 2G phones in 1980s
- Fifth generation computers (rise of artificial intelligence) (present and beyond)
- Commercialized Internet in 1990s
- 3G phones in 2001, 4G in 2009, 5G in current period

Public Mobile Phone calls were first introduced in the UK

World Wide Web is currently the primary tool billions use to interact on the Internet, and it has changed people's lives immeasurably

Source: David C. Lindberg (1980). *Science in the Middle Ages,* David L. Woods, "Heliograph and mirrors", H. Sterling (ed), Military Communications: From Ancient Times to the 21st Century, Newspapers and from other sources on the internet

Theme 1: Historical Evolution

Library schools/ studies existed even before 1900s.

↓

Universities start to accommodate library Science as a more formal organized discipline since 1930s.

↓

In 1960-1970s emergence of Information Science was seen and most library schools start to rename their degrees as Library and Information Science, it also converged with cognitive science and communication studies departments.

↓

In 80s and 90s, rise of computer science was seen. Many tech/ engineering schools find informatics (traditionally named as information science) as a sub discipline within their STEM degrees.

↓

In 90s, Information Science degree programs start to assimilate modern telecommunication and computing technologies under the information science degrees.

↓

In early 2000s, Information Science discipline start to experience rapid changes and drastically challenge the unseen barriers of the discipline in knowledge production.

↓

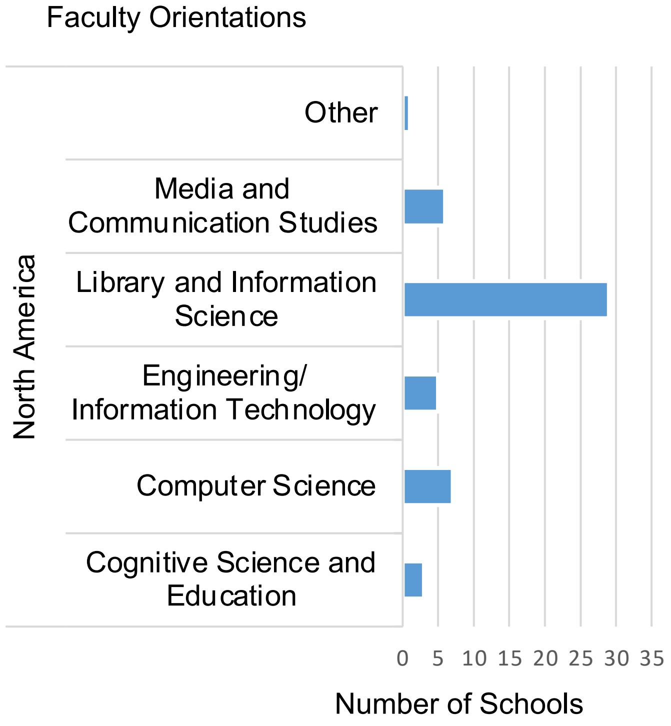
As a ‘convergent discipline’, it tries to establish its place in global knowledge politics. In 2005 iSchool consortium was established as part of the ongoing movement.

Observations

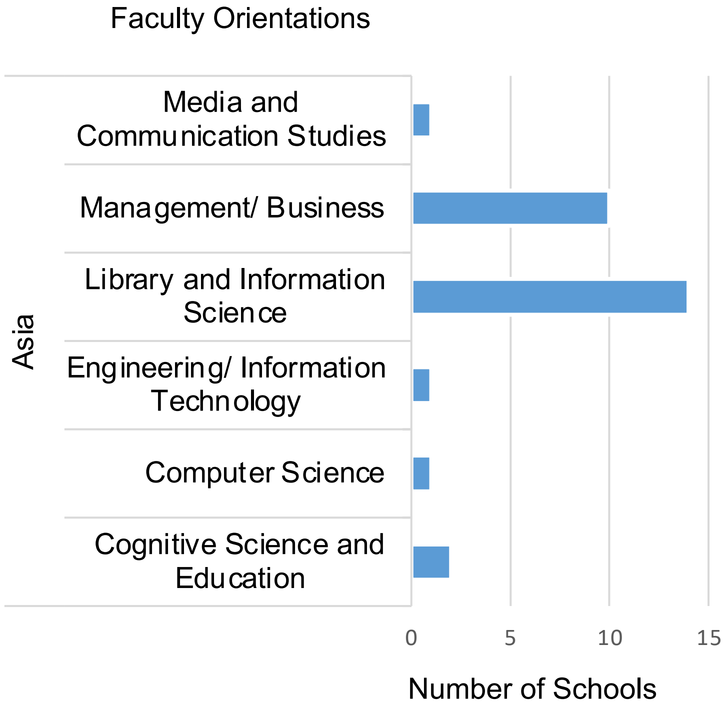
- This technological development contributed to the emergence of Information Science as an organized discipline in Europe and North America
- The field which was previously concerned about physical spaces such as libraries, museums, collections, and other repositories, soon started to respond to the digital and virtual spaces such as online communities, social networking, the World Wide Web, and databases in coherence with the dramatic change in the technological world
- Many schools, colleges, and departments was created or evolved from programs formerly focused on specific tracks to respond to the change of technologies
- However, the changes within the discipline were not homogenous in Asia, Europe and America, they evolved differently following the trends of technological advancements in those regions

Theme 2: Current Trends

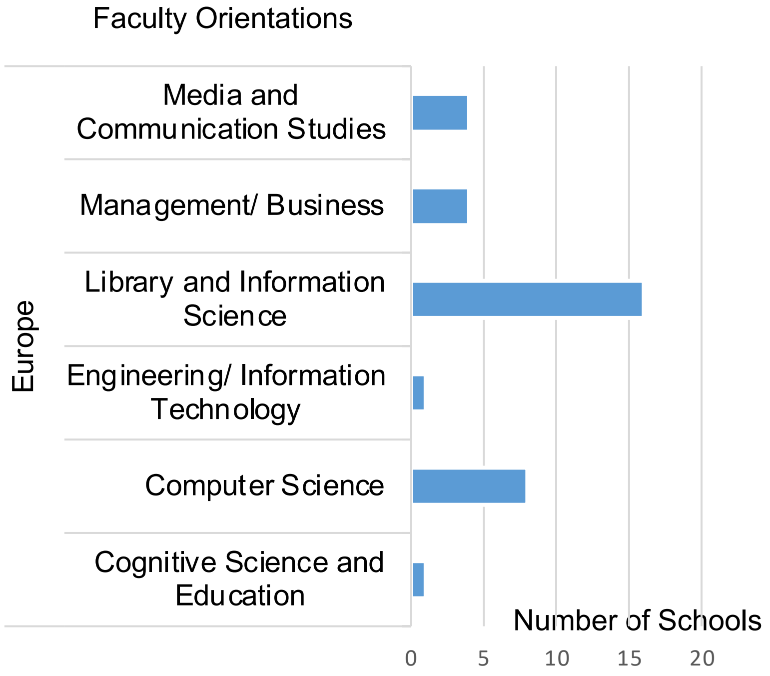
Regional trends in faculty orientations of Information Science Programs



North America

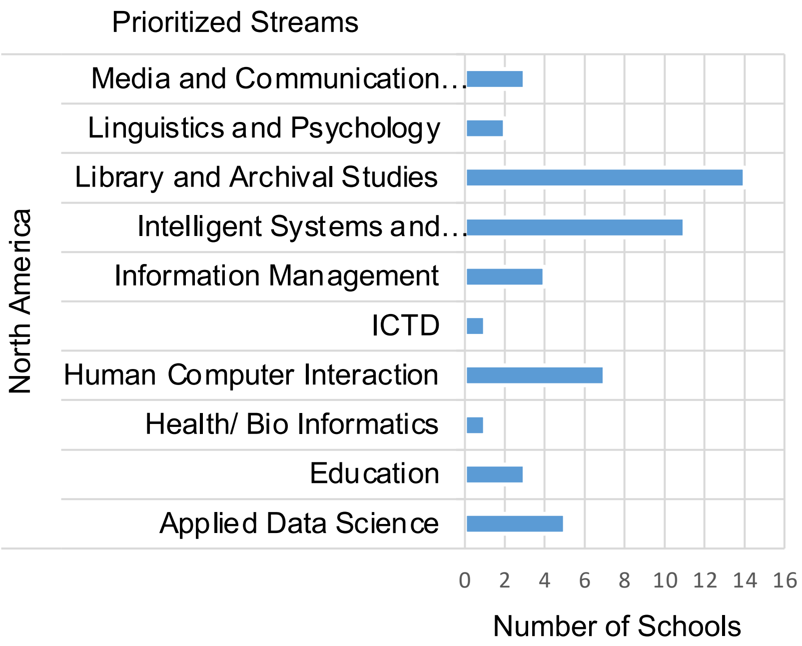


Asia

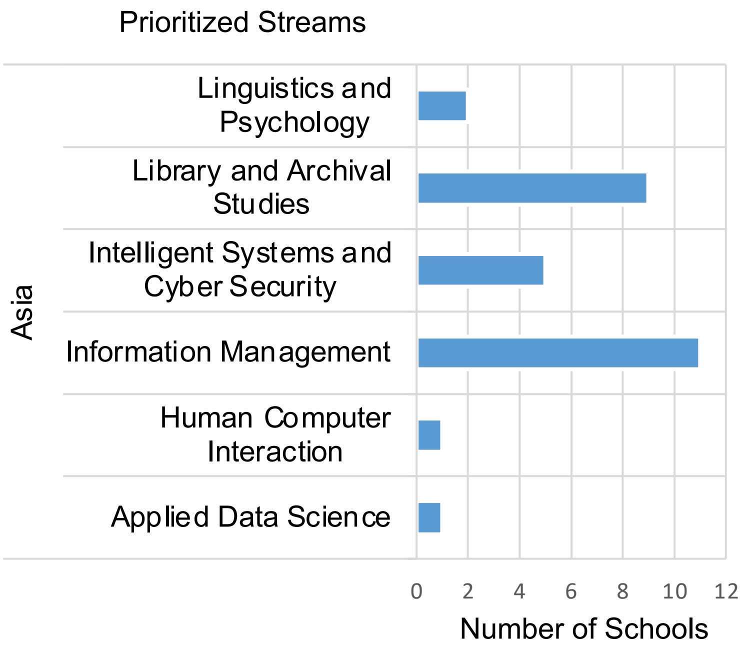


Europe

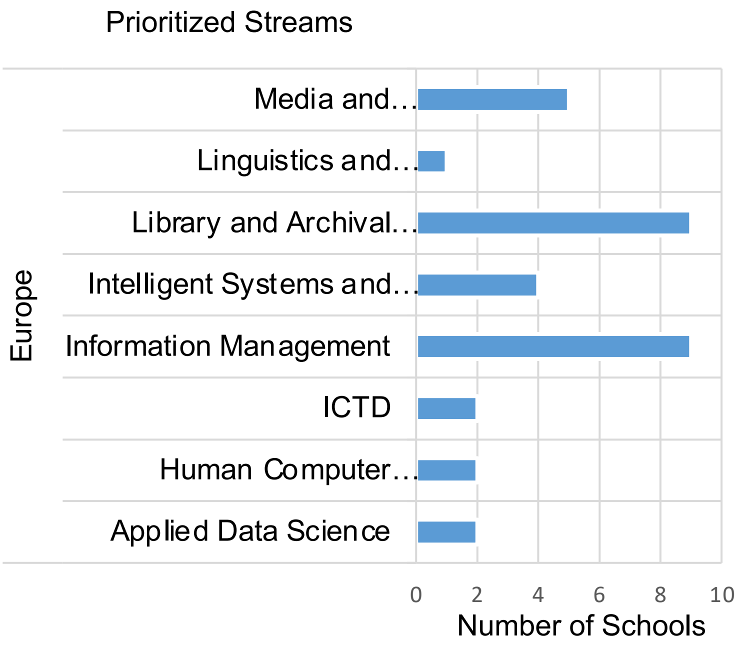
Regional trends in prioritizing streams within the curriculum



Priority of streams by the North American schools



Priority of streams by the Asian schools



Priority of streams by the European schools

Regional Differences in Universities' Responses

Case 1: University of Pittsburg (North America)

1901: The School of Library Science is established
1964: The school is renamed the Graduate School of Library and Information Science
1966: Pitt's Department of Computer Science is established
1974: The Master of Science in Information Science degree is introduced
1979: The Bachelor of Science in Information Science degree is introduced
1986: The Intelligent Systems Program is introduced
1987: The Master of Science in Telecommunications degree program is introduced
1996: The school's name is changed to the School of Information Sciences
After 2000: The School of Information Sciences, the Department of Computer Science, and the Intelligent Systems Program came together to found and create a new entity, the School of Computing and Information (SCI)

Case 2: University of the Philippines (Asia)

The Institute of Library Science was founded in 1961

The institute reinvented itself to be more attuned to the demands of the times by upgrading its programs and curriculum to be information technology-oriented starting school-year (SY) 1995-96

Later it became the Institute of Library and Information Science on August 2002. The change in name reflected the change in curriculum when the Institute shifted from the purely traditional forms of librarianship to information technology assisted librarianship

On March 2007, the Board of Regents approved its second change of name to School of Library and Information Studies in recognition of its dynamic growth

Case 3: Central China Normal University, Hubei, China (Asia)

In 1920, Library Science degree was offered

In 1983, the school offered specialization in Library and Information Science, and established the Department of Library and Information Science.

In 2012, the school was renamed as School of Information Management.

Information Science is a key discipline in Hubei Province. Besides, E-Commerce is a brand specialty in Hubei province.

The school's popular course is e-commerce management.

Theme 2: Current Trends

Observations

- Library or archival studies is prioritized by the schools which were established earlier, and the curriculum is still theoretical
- Media and Communication Studies and Linguistics and Psychology streams currently involve applied Information Science theories
- The Intelligent System and Cyber security stream is rapidly growing and has potential to be a separate subject/ discipline
- Few Schools are focusing on Health and Bio-informatics, but this is comparatively a new and powerful merger
- Many schools are offering separate degrees on HCI, this has potential be a separate subject/ discipline
- Applied Data Science stream is rapidly growing, involves interdisciplinary application of statistics
- Information Management is developed to respond market needs, Asian schools are prioritizing them

American iSchools position them in two ways

- Rigorous humanities and critical research while responding to the Academia
- Game Development/ AI/ other frontier technology while responding to the industry

In Asian Region

- Most schools respond to the industry needs and offer courses like Business Analytics, e-commerce, and information Management

In Europe

- We find a healthy balance in prioritizing streams with an extend focus in media and communications

ICTD: a stream of Information Science, already separating?

Although ICTD sometimes identifies under Information Science degrees as 'Development Informatics', there are already separate ICTD degree programs in Undergrad/ Graduate levels in universities across the world, these degrees are offered from Six differently oriented faculties

Development Studies
Ex: University of Sussex

International Affairs
Ex: University of Georgetown

Geography
Ex: University of London – Royal Holloway

Information Studies
Ex: University of Michigan

Computer Science
Ex: University of Berkeley

Media and Communication
Ex: University of West Indies

Observations

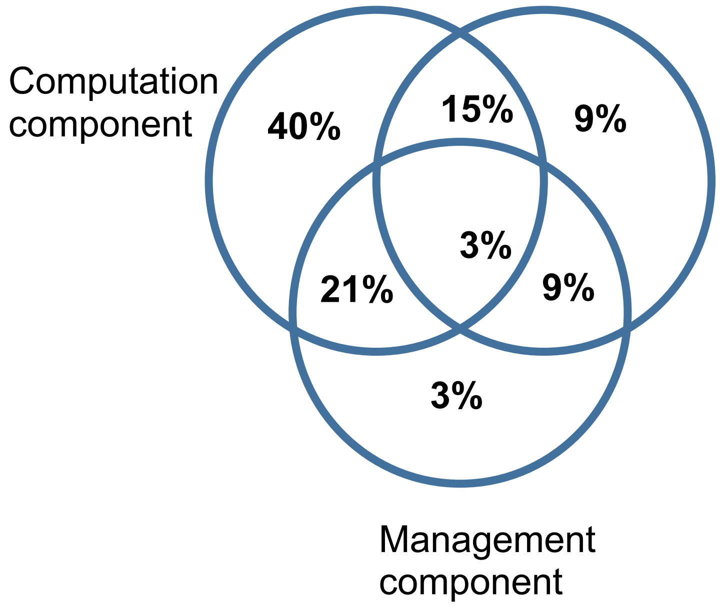
- ICTD as separate degree programs from variety of faculties already responding to the local and global development agenda
- Rise of Development Studies and International Affairs disciplines accelerated this process 1950 onwards
- In majority cases, they are taught in developed countries although the curriculum involves developing ICT tools and methods to better capacitate developing countries

Theme 4: Bangladesh Situation

Bangladesh Situation

Broadly, we find three components in global Information Science curriculum: Computation component, Social Science (Archival, Media and Communication Studies) component and Information Management components.

In Bangladeshi universities we find these components in curriculums of different degree programs:



These degrees are offered from differently oriented faculties:

Computer Science/ IT (60%)
Mass Communication and Journalism (18%)
Business (15%)
Others (6%)

Observations

- Bangladeshi Universities, on majority basis, are focusing on Intelligent Systems and Cyber Security stream of Information Science in response to the global trends
- Only degree program in Library and Information Science: Post Graduate Diploma in Rajshahi University, that is supposedly to cover all three components of Information Science
- BIGD, BRAC University has a unique program of MDS which offers Development Informatics/ ICTD course within its curriculum

To better design useful and relevant degree programs or courses, Bangladeshi universities should carefully prioritize or make a balance between their mandates of global *knowledge generation* and local workforce creation

Universities covered in this work

North America

Albany, University of
Arizona, University of
Berkeley, University of California
British Columbia, University of
Carnegie Mellon University
Cincinnati, University of
Colorado - Boulder, University of
Cornell University
Dominican University
Drexel University
Florida State University
George Mason University
Georgia Tech
Illinois at Urbana-Champaign, University of
Indiana University at IUPUI
Indiana University Bloomington
Irvine, University of California
Kent State University
Kentucky, University of
Long Island University
Louisiana State University
Maryland - Baltimore County, University of
Maryland, University of
McGill University, Montreal
Michigan State University
Michigan, University of
Missouri, University of
Montréal, University of
North Carolina at Chapel Hill, University of
North Texas, University of
Oklahoma, University of
Pennsylvania State University
Pittsburgh, University of
Pontificia Universidad Javeriana
Pratt Institute
Rochester Institute of Technology
Rutgers, The State University of New Jersey
San Jose State University
São Paulo - USP, University of
Simmons University, Boston
South Carolina, University of
South Florida, University of
State University of New York at Buffalo
Syracuse University
Tennessee, The University of
Texas A&M University – Kingsville
Texas at Austin, University of
Toronto, University of
UCLA, University of California at Los Angeles
University of Denver
Wayne State University
Wisconsin - Madison, University of
Wisconsin-Milwaukee, University of

Europe

Aalborg University
Amsterdam, University of
Bar-Ilan University
Borås, University of
Carlos III de Madrid, Universidad
Catalonia, Open University of
Charles University in Prague
Copenhagen, University of
Dublin, University College
Glasgow, University of
Hacettepe University
Humboldt-Universität zu Berlin
IMT Atlantique
Linnaeus University
London, University College
Makerere University
Manchester Metropolitan University
Minho, Universidade do
Northumbria University
Nova de Lisboa, Universidade
Oslo Metropolitan University
Oxford, University of
Polytechnic University of Valencia
Porto, University of
Regensburg, Universität
Robert Gordon University
Sheffield Hallam University
Sheffield, University of
Siegen, Universität
Strathclyde, University of
Strossmayer University of Osijek
Tampere, University of
Universidad de Granada
University of Applied Sciences of the Grisons

Asia Pacific

Central China Normal University
Charles Sturt University
Chinese Academy of Sciences, University of the
Curtin University
Ewha Womans University
Hong Kong, University of
Jilin University
Khon Kaen University
Kyungpook National University
Kyushu University
Melbourne, University of
Monash University
Multimedia University / Faculty of Information Science and Technology (FIST)
Nanjing University
Nanjing University of Science and Technology
Nankai University
National Taiwan Normal University
National Taiwan University
Peking University
Philippines, University of the
Renmin University of China
Seoul National University
Shanghai University
Soochow University
Sukhothai Thammathirat Open University
Sun Yat-sen University, Guangzhou
Sungkyunkwan University
Te Herenga Waka -- Victoria University of Wellington
Teknologi MARA, Universiti
Tsukuba, University of
Waikato, University of
Wuhan University
Yonsei University
Zhengzhou University

Bangladesh

Dhaka University
Bangladesh University of Engineering and Technology
Sahjalal University of Science and Technology
Rajshahi University
Brac University
Jahangirnagar University
North South University
University of Chittagong
Independent University Bangladesh
Daffodil International University
Khulna University
Rajshahi University of Engineering and Technology
Chittagong University of Engineering and Technology
Khulna University of Engineering & Technology
Military Institute of Science & Technology

ICTD programs, Faculty Orientations, Current Streams

Institutions that offer ICTD Degree Programs

Chulalongkorn University
Hasso Plattner Institute/University of Cape Town
Malmo University
Ohio University
Open University of Catalonia (UOC)
Standford
University of California - Berkeley
University Colorado at Boulder
University of Georgetown
University of London - Royal Holloway
University of Oxford
Universidad Rey Juan Carlos
University of Manchester
University of Michigan
University of the Philippines Los Banos
Universidad Rey Juan Carlos
University of Stockholm
University of Sussex
University of Tokyo
University of Washington
University of the West Indies
United Nations University - International Institute for Software Technology (UNU-IIST) and University of Pisa

Faculty Orientation Category	Includes
Cognitive Science and Education	Education, Linguistics, Psychology, Child Development, Human Science
Computer Science	Computer Science and Engineering, Informatics and Computing
Engineering/ Information Technology	Information Technology, Electrical and Electronics Engineering, Electronics and Communication Engineering
Library and Information Science	Library and Archival Studies, Library and Information Science
Management/ Business	Business Studies, Information Management
Media and Communication Studies	Communication and Arts, Media Studies, Communication Studies
Other	Disaster Preparedness

Category of Streams	Includes
Applied Data Science	Data Analytics, Data Informatics, Big Data
Education	Learning Technologies
Health/ Bio Informatics	
Human Computer Interaction	Human Centred Computing, UX Design, Design Informatics
ICTD	Development Informatics
Information Management	Business Analytics, Information Systems Management
Intelligent Systems and Cyber Security	Game Development, Robotics, AI, Information Security
Library and Archival Studies	Library Science, Museum and Archival Studies
Linguistics and Psychology	
Media and Communication Studies	Cultural Studies Journalism