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# CHAPTER 1

## GENERAL INFORMATION

### ***1.1 Introduction***

Chittagong University of Engineering & Technology abbreviated as *CUET*, is one of the prominent and prestigious degree awarding institutes in the engineering education of Bangladesh. This University was created out of the Engineering College, Chittagong which was established in 1968. The Engineering College, Chittagong, functioned as the Faculty of Engineering of the University of Chittagong. Through a Government Ordinance in 1986 the college was converted into an autonomous institute of Technology named as Bangladesh Institute of Technology, Chittagong (BIT, Chittagong). In 2003 this institute was converted into a public university named as Chittagong University of Engineering & Technology (CUET). The honorable President of the peoples' Republic of Bangladesh is the Chancellor of the University. Since its inception as Engineering College, it has been playing a pioneering role for higher research & development in the field of Engineering & Applied Sciences.

CUET is unique and incompatible due to its proximity to Chittagong, the major sea-port and the beautiful Hill city of the country. The University is situated by the side of the Chittagong-Kaptai road, some 25 kilometers off from the center of Chittagong City and is taking shape in about 171 acres of land. Moreover, all the tourist attractions of the country like the large hydroelectric plant, the natural beauty of the lake of Kaptai, hill spots of Rangamati, Bandarban, Khagrachori, the longest sea beach of the world and tourist resort of Cox's Bazar are only a few hours journey.



**New CUET administration building**



**Pre-engineering building**



**CUET Shahid Minar**

## ***1.2 Administration***

The Vice-Chancellor is the Chief Executive Officer of the university. The Chancellor of the university, Honorable President of the People's Republic of Bangladesh, appoints the Vice-Chancellor for a four-year term. The administrative team comprises Vice-Chancellor, Pro-Vice-Chancellor, Deans of the Faculties, Directors of the institutes, Registrar, Heads of the academic departments, Librarian, Provosts of the residential halls, Director (Student-Welfare), Director (Planning & Development), Director (Research & Extension), Comptroller, Controller of the Examinations, Chief Engineer, and the Chief Medical Officer.

The Syndicate is the principal executive body of the university and it consists of 16 members. The Academic Council, the Finance Committee (FC) and the Planning & Development (P&D) Committee, etc. assist the Syndicate. The Academic Council, comprising the faculty of the university and other external expert members, is the apex educational body of the university.

## ***1.3 The University at a Glance***

The total number of students is, at present, about 4500; of them the number of postgraduate students is about 1000. Approximately 9000 students, including about 100 foreign students from Nepal, Pakistan, Srilanka, India, Iraq, Iran & Afghanistan successfully came out of the universities with various degrees. There are at present, about 260 faculty members are engaged in giving instructions to undergraduate and graduate students and also conducting research and consultancy works. In addition to the faculty members, about 500 officers and staffs are helping the University directly and indirectly to achieve its goals.

## CUET at a Glance

Chancellor		Vice-Chancellor	
Mr. Md. Zillur Rahman Hon'ble President of the People's Republic of Bangladesh		Prof. Dr. Mohammad Rafiqul Alam	
<b>1968:</b> Year of Establishment	<b>1986:</b> Transformation into Bangladesh Institute of Technology (BIT), Chittagong	<b>2003:</b> Conversion into Chittagong University of Engineering & Technology (CUET)	
Faculty	Departments	Students Intake	
		UnderGraduate Program (B.Sc. Engg./ B.Arch./ B.URP)	Graduate Program (M.Sc. Engg./ M. Engg./ M.Phil./ Ph.D.) (Approx. no. of students)
Faculty of Civil Engineering	<ul style="list-style-type: none"> <li>➤ Dept. of Civil Engineering (CE)</li> <li>➤ Dept. of Disaster &amp; Environmental Engineering (DEE)</li> <li>➤ Civil &amp; Water Resources Engineering (CWRE)</li> </ul>	130 (CE) 30(CWRE)	30 (CE) 30 (DEE)
Faculty of Mechanical Engineering	<ul style="list-style-type: none"> <li>➤ Dept. of Mechanical Engineering (ME)</li> <li>➤ Dept. of Petroleum &amp; Mining Engineering (PME)</li> <li>➤ Mechatronics &amp; Industrial Engineering (MIE)</li> </ul>	130 (ME) 30 (PME) 30(MIE)	30 (ME)
Faculty of Electrical & Computer Engineering	<ul style="list-style-type: none"> <li>➤ Dept. of Electrical &amp; Electronic Engineering (EEE)</li> <li>➤ Dept. of Computer Science &amp; Engineering (CSE)</li> <li>➤ Dept. of Electronics &amp; Tele- Communication Engineering</li> </ul>	130 (EEE) 130 (CSE) 30 (ETE)	30 (EEE) 30 (CSE)
Faculty of Architecture & Planning	<ul style="list-style-type: none"> <li>➤ Dept. of Architecture</li> <li>➤ Dept. of Urban &amp; Regional Planning (URP)</li> <li>➤ Dept. of Humanities</li> </ul>	30 (Architecture) 30 (URP)	
Faculty of Engineering & Technology	<ul style="list-style-type: none"> <li>➤ Dept. of Physics (Phy)</li> <li>➤ Dept. of Chemistry (Chem)</li> <li>➤ Dept. of Mathematics (Math)</li> </ul>		10 (Phy) 10 (Chem) 10 (Math)
Total students intake per academic year		<b>700</b>	<b>180 (Approx.)</b>

Institutes & Centers	Functions
➤ Institute of Earthquake Engineering Research (IEER)	➤ Offers Postgraduate Diploma (PGD) in Earthquake Engineering (EQE)
➤ Institute of Information & Communication Technology (IICT)	➤ Offers training program including CCNA certification, Android Mobile Application Development, Web Development etc. ➤ Offers Postgraduate Diploma (PGD) in Information & Communication Technology (ICT) ➤ Has system support wings
➤ Institute of Energy Technology (IET)	➤ Offers Master of Science & PhD degree
➤ Ceneter for River, Harbor & Landslide Research (CRHLSR)	➤ Perform research activities on related branch
➤ Center for Environmental Science & Engineering (CESE)	
➤ Center for Industrial Problems Research (CIPR)	
➤ Medical Center ➤ Language Center ➤ Bureau of Research, Testing & Consultancy ➤ Directorate of Planning & Development ➤ Directorate of Research & Extension ➤ Directorate of Students' Welfare	
Halls	
➤ For Male Students: 05 (one is under construction) ➤ For Female Students: 02 (one is under construction)	
Other organizations	
➤ Central Students' Union ➤ Computer Club ➤ Career Club ➤ Cultural organization Joyadhani ➤ Green for Peace ➤ CUET-Debating Society ➤ CUET Journalist Association (CUETJA) ➤ CUET Photographic and Film Society ➤ Robo Mechatonic Association (RMA) ➤ Andromeda Space and Robotic Research Organization (ASRRO)	

## CHAPTER 2

### INSTITUTE OF INFORMATION & COMMUNICATION TECHNOLOGY

#### *2.1 Introduction*

At the 71th meeting of Academic Council held on 15<sup>th</sup> December, 2011, the decision is granted that CICT will be converted to Institute of Information & Communication Technology (IICT) from the academic year of 2012-2013. As the reflection of the decision of Academic Council, CICT starts functioning as IICT from the academic year of 2012-2013.

IICT aimed to promote and provide facilities for post-graduate study in ICT for graduates from various disciplines, to actively pursue advance research in ICT in order to develop knowledge-based products and services, to produce manpower and expertise in ICT by carrying our training in diverse areas for those interested to step in profession as well as those already engaged in the profession. To achieve the aims and objectives, the Institute is performing under two wings; (i) Academic Wing and (ii) System and Support Wing.

#### *2.2 Aims & Objectives*

The aims and objectives of the IICT are as follows

- To promote and provide facilities for post-graduate study in ICT for graduates from various disciplines;
- To actively pursue advance research in ICT in order to develop knowledge- based products and services;
- To develop ICT facilities in order to create an on-campus environment conducive enthusiasm, innovation and enterprise, and to nurture innovative ideas and incubate promising initiatives;
- To produce manpower and expertise in ICT by carrying our training in diverse areas for those interested to step in profession as well as those already engaged in the profession and
- To provide consulting and advisory services to public and private organizations.

To achieve the above aims and objectives, the Institute will perform the following activities under two wings; (i) Academic Wing and (ii) System and Support Wing.

- ✓ *Activities of the Academic Wing:*
  - a. To offer courses leading to diplomas and degrees in the field of ICT;
  - b. To initiate, organize and perform studies and research on practical applications of ICT;
  - c. To promote and provide facilities for development of skilled manpower in ICT;
  - d. To provide short course and training to interested persons in the field of ICT;
  - e. To provide refresher course and training in emerging branches of ICT;
  - f. To hold conference, seminar, workshop and other events related development of ICT in the country;
  - g. To develop linkage and change programme with local and oversee organizations; and
  - h. To publish books, journals monographs on ICT, etc.
- ✓ *Activities of the System and Support Wing*
  - a. To promote the use of ICT in the University and the country;
  - b. To promote multidisciplinary development of computer applications;
  - c. To provide training to students, teachers, officers and employees of the University in the fields of ICT;
  - d. To produce software for indigenous use as well as for export;
  - e. To plan, install, maintain develop computer networks within the University and also link to other institutions in the country as well as the Internet;
  - f. To provide computing, infrastructural and advisory services to students, officers and teachers of the University; and
  - g. To provide advice and physical assistance different departments, institutes and office of the University in matters related to the purchase, operation, maintenance and development of computer hardware and software.

### ***2.3 System Support***

Through System and Support section we promote 24 hour connectivity to internet in all the academic buildings, administrative building, students' halls and residential area via 70 wifi routers and Broadband with 300Mbps Bandwidth. We facilitate all the above places of the university to be connected by optical fiber. Furthermore, the bill payment online system for the teachers and employees of this university was developed by the experts of IICT. In real term, any

software requirements of the University are developed and maintained continuously by the experts of the Institute.

## ***2.4 Academic Activities***

Academic section of IICT offers some different ICT based training programs to enrich manpower suitable to current job market. Those Training programs are CCNA, Web development, Android Mobile Application Development, Linux, Microsoft Office Management & Internet, Computer Hardware & Networking Fundamentals, Graphics Design & Outsourcing, Engineering Design with AutoCAD. At the same time, IICT is going to offer postgraduate diploma (PGD) in ICT to develop skilled professionals who will contribute to the nations' economy to develop the nation. Besides, other ICT development related workshops, seminars and events are arranged by the academic section to encourage people in ICT field. The highly qualified faculty and officials of IICT remain always in continuous quest to keep the pace with rapid development in IT and the world market demand by introducing new schemes of studies.

## ***2.5 Laboratory Facilities***

- ***CCNA Lab***

This Lab is decorated with latest computer facilities. This air conditioned laboratory is equipped with 28 computers, projectors and good sound system for better conduction of class. Here, fourteen 64 bit CPUs are configured with Core i7 processor with 8GB RAM whereas, remaining 32 bit CPUs are configured with Corei5 processor and 4 GB RAM.



**CCNA Lab**

- ***Video Conference Room***

This virtual classroom is established with the collaboration of Bangladesh Research and Education Network (BdREN). Further, BdREN has established 34 virtual classroom including it to different public universities with fully equipped modern technology. The virtual classroom facility can mostly mitigate the problem of teacher crisis. BdREN virtual classroom has made it possible to conduct an interactive class with 30 universities at a time.



**Video Conference Room (Two side view)**

## ***2.6 Faculty Members & Officers***

<b><i>Position</i></b>	<b><i>Name</i></b>	<b><i>Email</i></b>
<b><i>Director</i></b>	<b><i>Prof. Dr. Asaduzzaman</i></b>	<b><i>asadcu2t@gmail.com</i></b>
<b><i>Associate Director (System support)</i></b>	<b><i>Dr. Mohammad Rubaiyat Tanvir Hossain</i></b>	<b><i>mrthossain@cu2t.ac.bd</i></b>
<b><i>Research Lecturer</i></b>	<b><i>Tahmina Khanam</i></b>	<b><i>tahmina_iict@cu2t.ac.bd</i></b>
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<b><i>Assistant Programmer</i></b>	<b><i>Md. Abdullah Al Mamun</i></b>	<b><i>lmnmamun@gmail.com</i></b>
<b><i>Assistant Programmer</i></b>	<b><i>Md. Akber Hossain</i></b>	<b><i>akbermirage@gmail.com</i></b>
<b><i>Internet Service Operator</i></b>	<b><i>Md. Moyeen Uddin</i></b>	<b><i>moyeence2t@gmail.com</i></b>
<b><i>Assistant Technical Officer</i></b>	<b><i>Md. Monirul Islam</i></b>	<b><i>moonir.uits@gmail.com</i></b>

# CHAPTER 3

## POST GRADUATE DIPLOMA IN ICT

### ***3.1 Mission***

The mission of this programme is to provide learners with internationally relevant skills and knowledge specific to the disciplines within ICT ((Information & Communication Technology). Further, to prepare graduates for working in a range of entry/mid-level roles in the Information & Communication Technology (ICT) industry.

### ***3.2 Vision***

Promoting Information & Communication Technology (ICT) for sustainable development.

### ***3.3 Programme Educational Objectives***

The programme is committed and aimed to:

1. Eminent as ICT professional with proficiency in understanding, applying, analyzing and designing solutions to ICT relevant problems;
2. Synthesize and evaluate models for ICT management and accordingly, demonstrate managing of the various aspects of an ICT organization using accepted standards and best practices where appropriate;
3. Exhibit professionalism, team work, leadership skills and expose to current needs;
4. Excel as an entrepreneur with potential knowledge to design software based solutions to the complex problems and limitations of current solutions;

### ***3.4 Learning Outcomes***

Each graduate of the program should have an ability:

1. To apply problem solving skills, core ICT concepts, best practices and standards to information & communication technologies;
2. To identify and evaluate organizational requirements and current emerging technologies;

3. To select, design, integrate and administer ICT-based solutions into the organizational environment;
4. To plan and execute team projects effectively;
5. To describe the impact of ICT solutions in a global, societal, and ethical context;
6. To understand professional, ethical, legal, security and social issues and responsibilities;
7. To communicate effectively with a range of audiences;
8. To engage in continuing professional development and lifelong learning;

### ***3.5 Admission Requirements***

For admission to the courses leading to a PG. Dip. (ICT) a candidate

- a. must have at least one first class/ first division (or equivalent) in any public examination.
- b. must obtain at least 50% marks or CGPA of a minimum of 2.50 out of 4.0 or its equivalent in three or four year Bachelor's degree.
- c. must not have a third class/division in any public examination.
- d. must pass from a recognized university with Minimum 3-year graduation in any discipline, with Mathematics as a subject at H.S.C/A-Level (Science).

### ***3.6 Admission Procedures***

- a. Applications for admission to PG. Dip. (ICT) shall be invited through regular means of advertisement and shall be received by the Registrar.
- b. On the recommendation of the appropriate RAC (Research and Academic Committee) the rules for admission into the University for PG. Dip. studies shall be framed from time to time by the Committee of Higher Studies and Research (CHSR) and approved by the Academic Council.
- c. Before being finally selected for admission a candidate may be required to appear at an oral and / or written test by a Selection committee as constitute by the RAC. He/she will be required to take pre-requisite courses as may be prescribed by the Selection Committee. Every selected candidate, unless he/she has already been registered, shall get himself/herself registered with the University.

- d. After admission each student shall be assigned, by the RAC, an Adviser from among the teachers of the relevant Department or Institute not below the rank of an Assistant Professor or Research Assistant Professor. Before each enrolment and course registration for any semester/term, the Adviser / Supervisor shall check and approve his/her student's schedule for subjects, per-requisites as recommended by the Selection Committee and the total hours. The student is expected to consult his/her Adviser on all academic matters but it is the responsibility of the individual student to see that his/her schedule conforms to the academic regulations.
- e. Every registered student shall get himself/herself enrolled on payment of prescribed fees and other dues as per the University rules before the commencement of each term. In an academic year there will normally be three terms. All course registration must be completed within one week from the start of a term; otherwise, the student shall not be allowed to continue the course in that term.

### ***3.7 Academic Requirements***

- a. The minimum duration of the PG. Dip. (ICT) course shall normally be one academic year (Three Terms). A candidate for the PG. Dip. (ICT) must complete all the requirements for the diploma within three academic years from the date of his first enrolment in the programme.
- b. Academic progress shall be measured in terms of credit hours earned by a student. One credit hour subject shall normally required one hour of class attendance per week for one term while. The number of credit hours for each subject shall be as specified in the syllabus of the respective department or institute.
- c. For the PG. Dip. (ICT) a student must earn a minimum of 36 credit hours.
- d. There shall be two categories of students, namely, full-time students and part-time students.
  - Students, serving in different organizations, may be admitted as part-time students with a written consent of the employer, A part-time student may be assigned a maximum of 9 credit hours of course work.

- Full-time students must register for a minimum of 12 credit hours and a maximum of 15 credit hours per term. A full-time student shall not be allowed to be in the employment of any organization (even as a part-time employee). However, they may be employed as Teaching/ Research Assistant at the University. If a full-time student becomes an employee (full-time or part-time) of any other organization in the middle of a term, he/she may, with the approval of the Head of the Department or the Director of the Institute and his/her employer, be allowed to continue as a full-time student for the term.
- e. The courses of study in the different institutes/different departments shall be as recommended by the respective RAC and the CHSR or Faculty respectively and approved by the Academic Council. The RAC may review the curriculum from time to time and recommend any changes as may be considered necessary. The courses to be offered in any term shall also be as determined by the relevant RAC.
- f. A student on the recommendation of the relevant RAC and as approved by the CHSR may be allowed a transfer of credits of the courses completed by the student at a recognized institution provided that the courses were not taken earlier than three calendar years from the date of his first enrolment in the program at CUET and that the student obtained a minimum GPA of 3.0 out of 4.0 or its equivalent and that the courses are equivalent to the approved courses of CUET.
- g. On the recommendation of the appropriate RAC and CHSR the rules for admission into the University for postgraduate studies shall be framed from time to time by the Academic Council. CHSR on its own may, if it deems fit, recommend such rules for Admission for approval of the Academic Council.

### ***3.8 Grading System***

- a. The grades for courses shall be recorded as follows:

<b>Marks Range</b>	<b>Grade</b>	<b>Grade Points</b>
90% or Above	A+	4.00
85% to below 90%	A	3.75
80% to below 85%	A-	3.50

<b>Marks Range</b>	<b>Grade</b>	<b>Grade Points</b>
75% to below 80%	B+	3.25
70% to below 75%	B	3.00
65% to below 70%	B-	2.75
60% to below 65%	C+	2.50
55% to below 60%	C	2.25
50% to below 55%	D	2.00
Below 50%	F	0.00
	I	Incomplete
	S	Satisfactory
	U	Unsatisfactory
	W	Withdrawn

- b.** Courses in which the student gets F grades shall not be counted towards credit hour requirements and for the calculation of Grade Point Average (GPA).
- c.** Grade I is given only when a student is unable to sit for the examination of course at the end of the term because of circumstances beyond his control. He/she must apply to the Head or Director of the concerned Department or Institute within one week after the examination to get an I grade in that course. It must be completed within the next three terms, otherwise, the I becomes an F grade. He/she may, however, be allowed to register with further payment of 50% tuition fees for the course.
- d.** Students may enroll for non-credit course(s) termed as audit course(s) on recommendation of Head of the relevant department or Director of the Institute. When he/she completes the audit non-credit course(s) and fulfils the requirements to get at least a 'C' grade he/she will be given a final grade of 'S' in the courses(s). And his/her grade for such course(s) will not be counted for calculating his/her GPA.
- e.** Satisfactory or Unsatisfactory used only as final grades for non-credit courses.
- f.** Officially withdrawn from a course-A student may withdraw officially from a course within two working weeks of the commencement of the term otherwise his/her grade in that course shall be recorded as F unless he/she is eligible to get a grade of I. A student

may be permitted to withdraw and change his/her course within the specified period with the approval of his/her Adviser, Head of the department or the Director of the Institute and the respective teachers(s) concerned.

### ***3.9 Conduct of Examination***

- a.** In addition to tests, assignments and / or examinations during the term as may be given by the teacher(s) concerned, there shall be a written examination and / or other tests for each of the subjects offered in a term at the end of that term, the dates of which shall be announced by the Controller of Examinations, CUET as advised by the Director of the Institute at least two weeks before the commencement of the examination. The final grade in a subject shall be based on the performance in all tests, assignments and / or examinations.
- b.** The controller of Examinations shall keep up to date record of all the grades obtained by a student in individual Academic Record Card. Grades shall be announced by the Controller of Examinations at the end of each term. In addition, each student is entitled to one official transcript of the University record without any fee at the completion of his academic programme from the office of the Controller of Examinations on production of statement of clearance from all Departments / Institutes / Offices.
- c.** The RAC shall recommend the names of the paper setters and examiners for the term examinations at least two weeks before the date of commencement of the examination to the Vice-Chancellor for approval.

### ***3.10 Qualifying Requirements***

- a.** The qualifying requirement for the diploma is that a student must earn a minimum grade point of 2.5 based on the weighted average in his/her course works.
- b.** A student obtaining F grade in a course may be allowed to repeat the course with the prior approval of the RAC. Performance in all the courses including all the F grades shall, however, be reflected in the transcript.

- c. If the number of F grades obtained by the student is three or more in the same or different subjects taken together, he/she shall not be allowed to continue in the programme.
- d. If at the end of the second or any subsequent semester / term, the cumulative GPA falls below 2.5 he/she shall not be allowed to continue in the programme.
- e. In addition to successful completion of course works a student requiring a project work shall submit a report on his/her project work, fulfilling the requirements as detailed in the following sections.

### ***3.11 Project***

- a. Project work shall be carried out under the supervision of a full-time member of the staff belonging to the relevant Department / Institute. However, in special cases, a full-time member of the staff belonging to a Department / Institute / Centre outside the student's relevant Department / Institute of the University may be appointed as Supervisor, if the research content of the project work is within the field of specialization of the member of the staff. The title of the project, cost and the Supervisor shall be recommended by the RAC for approval of the Vice-Chancellor. This approval will be reported to the CHSR.
- b. If any change is necessary of the approved project (title, content, cost, Supervisor etc.) it shall be approved by the Vice-Chancellor on recommendation of the relevant RAC. This approval will be reported to the CHSR.
- c. The project work must be carried out in this University or at a place approved by the Vice-Chancellor on recommendation of the Supervisor in consultation with the Head of the Department / Director of the Institute. The work schedule and financial involvement should be mentioned in the project proposal for carrying out project work outside the university.
- d. Every student shall submit to the Head of the Department / Director of the Institute, through his/her Supervisor, required number of type written copies of his/her project report in the approved format on or before a date to be fixed by the Supervisor concerned in consultation with the Head of the Department / Director of the Institute.

- e. The student shall certify that the research work was done by him/her and that this work has not been submitted elsewhere for the award of any other diploma or degree.
- f. Every student submitting a project report in partial fulfillment of the requirement of a diploma shall be required to appear at an oral examination, on a date or dates fixed by the Supervisor concerned in consultation with the Head of the Department / Director of the Institute and must satisfy the examiners that he/she has gained satisfactory knowledge related to the project work.

### ***3.12 Project Examination Board***

- a. An Examination Board for every student for project and oral examination shall consist of at least three members including the Supervisor. The Supervisor shall act as the Chairman. The RAC shall recommend the names of examiners for approval of the Vice-Chancellor. This approval will be reported to the CHSR. The Examination Board shall be constituted as follows:
  - (i) Supervisor (Chairman)
  - (ii) Director of the institute (Member)
  - (iii) One member from within the Department/ Institute (Member)
  - (iv.) One member from within or outside the Department/ Institute (Member)
- b. If any examiner is unable to accept the appointment or has to relinquish his/her appointment before the examination, the Vice- Chancellor shall appoint another examiner in his/her place, on recommendation from the Supervisor in consultation with the Head of the Department or the Director of the Institute. This appointment shall be reported to the CHSR.
- c. In case a student fails to satisfy the Examination Board in project report and /or oral examination, the student shall be given one more chance to resubmit the project report and/or appear in oral examination as recommended by the Board.

### ***3.13 Rules of Striking off and Removal of Names***

The name of the student shall be struck off and / or removed from the rolls of the University on the following grounds:

- (i) Non-payment of dues within prescribed period. Post graduate students residing in the halls of residence shall be subject to the same conditions as allowed in the Ordinance Relating to the Board of Residence and Discipline.
- (ii) Failing to proceed with the programme by the exercise of any of the Art. 3.7 (a) or 3.10 (b) or 3.10 (c) of this Ordinance.
- (iii) Failing to make satisfactory progress in his/her programme as reported by the Advisor/ Supervisor through the RAC and approved by CHSR.
- (iv) Forced to discontinue his/her studies by the Board of Residence and Discipline.
- (v) Withdrawn officially from the P.G. Dip Programme.

### ***3.14 Academic Fees & Duration***

- Duration : Full time - 1 year  
Part time- 1.5 year
- Total Credit- 36  
Theory Courses: 30 Credit  
Thesis/Project: 6 Credit
- Tuition fees are  
**Theory course: Tk 1600.00 per credit**  
**Thesis/Project: Tk 2800.00 per credit**
- Total Expenditure: **64800/-** (Theory:  $1600 \times 30 = 48000$  + Thesis:  $2800 \times 6 = 16800$ )

# CHAPTER 4

## SUMMARY OF COURSES

### Group A

(Core Courses) 3x6 =18 credits

Project/Thesis =6 credits

### Group B

(Optional Courses) 3x4 =12 credits

**Total Credits:** 36 credits

**Medium of Instruction :** English

### Group A

All of the following to be taken 3x6=18 credits

Course Number and Name	Credit Hours
ICT 5100 (Project)	6
ICT 5101 (Computer Basics and Programming)	3
ICT 5102 (Object Oriented Programming)	3
ICT 5103 (Data Structures and Algorithms)	3
ICT 5104 (Database Design and Management)	3
ICT 5105 (Introduction to Telecommunications)	3
ICT 5106 (Computer Networks)	3

### Group B

Any four of the following to be taken,  $3 \times 4 = 12$  credit hours.

Course Number and Name	Credit Hours
ICT 5201 (Operating System Concepts)	3
ICT 5202 (Visual Programming)	3
ICT 5203 (Web Technologies, Protocols, and Applications)	3
ICT 5204 (Multimedia Design and Development)	3
ICT 5205 (Client Server Technologies)	3
ICT 5206 (Electronic Commerce)	3

ICT 5207 (Information System Analysis and Design)	3
ICT 5208 (Software Engineering and Application Development)	3
ICT 5209 (Software Quality Management)	3
ICT 5301 (Information System and Network Security)	3
ICT 5302 (Advanced Internet Technologies)	3
ICT 5303 (Network Programming and Management)	3
ICT 5304 (Digital Communications)	3
ICT 5305 (Mobile Communications)	3
ICT 5306 (Software and Database in Telecommunication)	3
ICT 5307 (Embedded System Design)	3
ICT 5308 (Network System Design)	3
ICT 5309 (Optical Communication)	3
ICT 5310 (Data Communications)	3

# CHAPTER 5

## DETAILED OUTLINE OF COURSES

### Core Courses:

#### **ICT 5100 Project**

6.00 credit, 12 hours/week

Study of practical problems in the field of Information and Communication Technology (ICT).

#### **ICT 5101 Computer Basics and Programming**

3 credits, 3 hours/week

Introduction to Computer fundamentals: Types and generation of computer, basic organization and functional units, input, output and memory devices, keyboard, mouse, OMR, OCR, MICR, CD ROM, Printers, CRT, microfilm, floppy disk, hard disk, magnetic tape, etc. Number systems & codes, Digital logic: Boolean algebra, De-Morgan's Theorems, logic gates and their truth tables, canonical forms, combinational logic circuits and sequential logic circuits. Programming algorithms and flow chart. Information representation in digital computers. Elements of computer structures and languages. Principles of programming. Structured programming concepts. Writing, debugging and running programs: Variables, Data Types, Operators and Expressions, Control flow, Procedures and Functions, Arrays.

#### **ICT 5102 Object Oriented Programming Concepts**

3 credits, 3 hours/week

Concepts of object oriented programming, Classes, Friend functions: Objects, isomorphism, polymorphism, inheritance, parameterized constructors, multiple inheritance, passing object to functions, arrays of objects, pointer to objects. Function and operator overloading, overloading constructor functions, references, virtual functions, Exception Handling, streams, Dynamic allocation, Static class members, Multi threaded programming, Records, Graphics.

#### **ICT 5103 Data Structure and Algorithm**

3 credits, 3 hours/week

Introduction to elementary data structures: arrays, records, linked lists, stacks, queues, trees; Complexity analysis of algorithms; Basic search and traversal techniques; Sorting algorithms;

Methods for the design of efficient algorithms: recursion, divide and conquer, greedy method, dynamic programming; Graph algorithms.

### **ICT 5104 Database Design and Management**

3 credits, 3 hours/week

Introduction to database; Relational model: structure, relational algebra, SQL and advanced SQL, database design and the entity-relationship model, Relational database design and normalization, application design and development, indexing, Database storage and file structure, transaction management, concurrency control recovery management, object database and database administration.

### **ICT 5105 Introduction to Telecommunications**

3 credits, 3 hours/week

Overview of telecommunication: history, evolution, convergence of telecommunication and data networks, standards; Basics of communication systems: modulation, multiplexing; Switching system: circuit switching, packet switching; Voice over Internet Protocol (VoIP), Fax over IP network, voice over frame relay, and ATM; Telephony: operating principles, telephone apparatus, description of the modern phone; Telephone switching systems: PBX, Centrex, ACDs, call centers, computer integration; Data communication equipment: introduction to terminals, modems, RS-232 and other interfaces, modem types; Tele-Traffic analysis; Cellular telephony: Frequency reuse, frequency management, channel alignment, handoffs strategies, FDMA, TDMA, CDMA and GSM, Introduction to satellite communication, Optical fibre communication, Submarine cables, Digital Radio Microwave, etc.

### **ICT 5106 Computer Networks**

3 credits, 3 hours/week

Overview of LAN concepts, media, collision and broadcast; MAC address; Token ring, Fiber Distributed Data Interface (FDDI), Ethernet and Carrier Sense Multiple Access Collision Detect (CSMA/CD), IEEE 802.3., LAN topology; Network layer: internetworking, routing, IPv4 and IPv6 addressing, sub netting, VLSM, NATPAT, ACL, ARP and RARP, DHCP, RIP, IGRP and EIGRP, OSPF; Upper layers of OSI model; Wireless LAN: Ad hoc, infrastructure networks; WAN services: analog dial-up, ISDN dial-up, dedicated leased line, X.25, frame relay, ATM; IEEE802.11: physical layer, framing, multiple access techniques, blue-tooth, IEEE 802.15;

Broadband wireless: Wireless ATM, 802.16; local multipoint distribution service (LMDS), Multi channel Multipoint Distribution System (MMDS); Network protocols: mobile IP, cellular IP, mobile Ad hoc networking.

### **ICT 5201 Operating System Concepts**

3 credits, 3 hours/week

Overview of operating system and its role in computer systems; Process: process model, inter-process communication; thread model; CPU scheduling; Memory management, virtual memory, address translation; File systems: files, directories, protection and security; Input, output; Deadlock; Introduction to UNIX, UNIX kernel, UNIX commands, services, device structure, memory structure, process and jobs, file system and file management, vi and emacs editors, shell programming; LINUX: user management, privilege, using rpm, using configuration files.

### **ICT 5202 Visual Programming**

3 credits, 3 hours/week

Concepts of visual programming; Data types, variables and expressions, control structures; Classes and objects, constructors; Inheritance, packages and interfaces; Exception handling; Collection classes: array, vector; Threads; GUI development; applets; Graphics and multimedia; Servlet; JDBC; Java beans; Java server page; Java networking.

### **ICT 5203 Web Technologies, Protocols, and Applications**

3 credits, 3 hours/week

Web architecture and HTTP: history and architecture of the World Wide Web, overview of the Hyper Text Transfer Protocol, other related protocols; Hyper Text Mark Language (HTML): concept of markup, overview of HTML (table, form, frame, window, link etc.); Client side scripting: variables data types, control structure, functions, Document Object Model (DOC), event handlers, properties methods, cookies; Server side scripting: concepts, variables, data types, control structure, functions, objects; Database: content generation, data exchange; Regular expressions, mails, cookies, sessions; Middleware: object management architecture, object request brokers (CORBA, OLE/COM), services (trading, naming, event, transaction, security), interorb protocols (e.g. the Internet Interorb protocol).

### **ICT 5204 Multimedia Design and Development**

3 credits, 3 hours/week

Introduction to multimedia, image, sound, video formats and their different properties, compression, playing and recording techniques, merits and demerits, conversions between different formats and their combinations; Multimedia authoring, introduction to web and HTML, basic HTML tags design principles; Drawing: basic image properties, image manipulation, layers, colors, text, texture, brightness, contrast, filters and effects; Interactive application development using multimedia tools.

### **ICT 5205 Client Server Technologies**

3 credits, 3 hours/week

Introduction, components of client server architecture, middleware, socket, Remote Procedure Call (RPC), Distributed Computing Environment (DCE), Common Object Request Broker Architecture (CORBA), Java Remote Method Invocation (RMI), Enterprise Java Beans (EJB), distributed data management, client-server application development, storage management, security and user management, backup and recovery, performance tuning.

### **ICT 5206 Electronic Commerce**

3 credits, 3 hours/week

Overview of electronic commerce, business models; E-commerce channels: portals, auctions, communities, marketplace; Managing the marketplace: Demographics and advertising; Customer relationship management, web services for B2B and B2C ecommerce, electronic payment systems; Network security, cryptography, digital certificates; Markup for e-commerce: ebXML, M-commerce, L-commerce, wireless and U-commerce, digital money and electronic banking; Ethical, legal, and regulatory environment: Intellectual property, copyright, trademark, patents.

### **ICT 5207 Information System Analysis and Design**

3 credits, 3 hours/week

Different types of information systems, attributes of information, roles, tasks and attributes of a system analyst, sources of information, information gathering techniques, handling of missing information, steps of system analysis, different types of feasibility analysis; Design of an information system: process modeling, logic and timing modeling, conceptual data modeling; Project effort analysis method, designing user interfaces, database and file design, project team

organization, project management and documentation, system installation and commissioning, analysis of system maintenance and upgrading; Ethics, privacy control and security; Case study of an information system.

### **ICT 5208 Software Engineering and Application Development**

3 credits, 3 hours/week

Software engineering paradigms, process models, complexity models, requirement engineering, different models of effort, schedule-and cost-estimation, risk analysis and management, project management, different software design methodologies, verification and validation, testing philosophy and methods, software configuration management, software metrics, software reliability and availability, software maintenance and software re-engineering, development of applications using software engineering concepts.

### **ICT 5209 Software Quality Management**

3 credits, 3 hours/week

Software quality, software process and process metrics, different quality metrics of software; Verification and validation tasks and techniques, software error and defect removal, SQA management and models, statistical quality control; Quality management system: ISO 9000, ISO 9001, and IEEE 12207 Standards; Compliance criteria of different standards: 9000/AS-3563 and ISO 9001, Capability Maturity Model (CMM), People Capability Maturity Model (P-CMM); Benchmarking and certification.

### **ICT 5301 Information System and Network Security**

3 credits, 3 hours/week

Fundamentals of cryptography, security for communication protocols, security for operating systems and mobile programs, and security for electronic commerce, passwords and offline attacks, DES, RSA, DSA, SHA, SSL, CBC, IPsec, SET, DDOS attacks, biometric authentication, PKI smart cards, S/MIME, privacy on the Web, viruses, security models, wireless security, and sandboxing.

### **ICT 5302 Advanced Internet Technologies**

3 credits, 3 hours/week

Introduction to the Internet: Introduction to XML, XHTML, XSL, integrating JavaScript and XSL; Internet Address, sockets; Application specific protocols and services: authentication, domain name services (DNS), electronic mail, world wide web, web caching, network management, internet control message protocol (ICMP), file transfer protocol (FTP), secured remote access; Voice over IP and its protocols, Next generation of internet, Revolutionary application of internet.

### **ICT 5303 Network Programming and Management**

3 credits, 3 hours/week

Concepts of network operating system, streaming technology, inter process communication (IPC) between application programs, Abstract Syntax Notation One (ASN.1), TELNET, File Transfer Protocol (FTP), simple mail transfer protocol (SMTP), Simple Network Management Protocol (SNMP), network programming, socket-level interface, algorithm and issues in client / server software design; installation, administration and management of commercial network software packages; Network information service (NIS) and network file system (NFS); State-of-the-art network management tools and systems, high speed LAN, MAN, network management and troubleshooting techniques.

### **ICT 5304 Digital Communications**

3 credits, 3 hours/week

Overview of different types of communication networks and their architecture; A/D conversion; GIF, JPEG, PNG; Audio coding for fixed telephone network and speech coding for mobile communications; Image and video coding: JPEG and MPEG; Channel coding: scrambling, convolution coding, cyclic redundancy checks, scrambling and interleaving; Modulation schemes: ASK, PSK, FSK, and GMSK. Modulation for local access: ADSL, DSL; Multiple access technologies, high speed PSTN access technology; Routing strategies, numbering schemes, Switching techniques: space switching, store and forward switching; Routing strategies; Numbering schemes; VSAT and satellite communication; Audio and video conferencing technique, Cable and satellite TV networks, HDTV transmission.

### **ICT 5305 Mobile Communications**

3 credits, 3 hours/week

An introduction to ubiquitous communication; Wireless transmission: frequencies for transmission, International Regulations and Regulatory Authorities, signals, antennas, signal propagation, multiplexing, modulation, spread spectrum; Medium access control: SDMA, FDMA, TDMA, CDMA; Radio network planning; Fundamentals of cellular telephony: concept of cellular communications, frequency reuse, cell splitting, registration, terminal authentication, handoff; GSM and GPRS: services, system architecture, radio interface, protocols, handover, security; Next generation mobile telecommunications systems: 2.5G systems (EDGE, TETRA), 3G systems (UMTS, UTRAN), 4G and beyond; Wireless LANS and personal area networks: 802.11, IrDA, Blue-tooth, data services: WAP, mobile IP.

### **ICT 5306 Software and Database in Telecommunication**

3 credits, 3 hours/week

Introduction to hardware and software evolution; Software components: database, distributed database, real-time software, mapping of software components etc; Constraints on the software components: real-time behavior, service continuity, hardware limitations, software and hardware integration and dimensioning etc; Telecommunication software development: examples of life cycles; Methods and tools for: requirement capture, analysis, specification, architecture, design and development; Interfaces definition: problem overview, transparency of distribution; System tests; Database in telecommunication systems, database environment, relational and object databases; Database planning, design and administration; Database trends in telecommunication: real-time database, multimedia database, WWW servers and database, 3D image handling in database, multimedia and existing RDBMS.

### **ICT 5307 Embedded Systems Design**

3 credits, 3 hours/week

Concepts, classifications; Characteristics; Requirements; Introduction to embedded system design process, Unified Modeling Language (UML); Embedded micro-controller cores; Embedded memories; Technological aspects; Interfacing between analog and digital blocks; Signal conditioning, digital signal processing, sub-system interfacing; Interfacing with external systems, user interfacing; Design trade-offs, thermal considerations; Networked embedded systems: the I2C bus, the CAN bus, the Flex Ray; Example of applications.

### **ICT 5308 Network Systems Design**

3 credits, 3 hours/week

General design process, issues, documents. LAN design: Media, devices and tools; LAN topology, star and extended star, ring, bus; Physical layout, network map, cables and conduits, labeling; Firewall. Wireless LAN: Issues and motivations; standards, IEEE 802.11; Transmission techniques: Infrared, spread spectrum and narrow band microwave; Application areas: Extension, cross building interconnect, nomadic access, ad hoc networks; Equipments and devices. WAN design: Types and technologies; Equipments and devices; Structured design approach, considerations of design, selection and placement of devices; Evaluation of network performance, security, reliability, and management capabilities.

### **ICT 5309 Optical Communication**

3 credits, 3 hours/week

Introduction; Light propagation through optical fiber: Ray optics theory and mode theory; Optical fibers: Structure, conditions of propagation, attenuation, pulse dispersion, fiber joint and fiber couplers; Light sources and transmitters: Principle of light emission, modulation bandwidth and spectral properties; Photodiodes and receivers: Operational principles, electrical bandwidth, noise and sensitivity; Optical amplifiers: Construction, amplification and noise; Optical communication systems with analog and digital modulation formats: performance and system budgets; Multi channel systems.

### **ICT 5310 Data Communications**

3 credits, 3 hours/week

Introduction to data communication and networks; transmission media, signals, noises, modulation and demodulation, synchronous and asynchronous transmission, line encoding, error detection and correction, RS 232 interface, HDLC, flow control and error control; Channel multiplexing; Data network: point to point connections, circuit-switched, message switched and packet switched networks, WANs, ISPs and LANs, differences in ownership, speed and cost; Types of communication: client server communication, broadcast, unicast and multicast modes, simplex, duplex and half duplex information flow; Bandwidth: distribution of bandwidth, discrete bandwidth requirements, implications of other factors; Internet, OSI reference model, TCP/IP reference model, TCP/IP architecture.