Syllabus for B.Sc. (Hons.) in Information Technology

INSTITUTE OF INFORMATION TECHNOLOGY
JAHANGIRNAGAR UNIVERSITY
SAVAR, DHAKA-1342

SYLLABUS FOR B.Sc. (Honors) in Information Technology
Session: 2011-2012 to 2014-2015
Program:
B. Sc. (Hons.) in Information Technology shall extend over a period of four academic years and will consist of eight semesters. The program is hereinafter called Undergraduate Program. Each year will divide into two semesters. Each semester will have the duration of six months. Students shall be evaluated in each semester. A semester will be segmented into Class-weeks, Preparatory leave and Semester-end examination. The total time distribution for completing a semester will be as follows:

<table>
<thead>
<tr>
<th>Sl.</th>
<th>Segment</th>
<th>Period</th>
<th>Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>I.</td>
<td>Classes</td>
<td>1st Week to 13th Week</td>
<td>14 Weeks</td>
</tr>
<tr>
<td>II.</td>
<td>Preparatory leave before semester-end examination</td>
<td>14th Week</td>
<td>1 Weeks</td>
</tr>
<tr>
<td>III.</td>
<td>Semester-end examination</td>
<td>15th Week to 17th Week</td>
<td>3 Weeks</td>
</tr>
<tr>
<td>IV.</td>
<td>Result Publishing &amp; Semester Break</td>
<td>18th Week to 21st Week</td>
<td>3 Weeks</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td>21 Weeks</td>
</tr>
</tbody>
</table>

During class-weeks, if classes do not held in any particular week due to the reason beyond the control of the university, the week shall deem to be an effective class-week, if number of working days is equal to or more than three.

Admission:
Admission of students and Examination of courses to the B.Sc. (Honors) program shall be guided by the Admission Ordinance and the Examination Ordinance of the University.

Eligibility:
Eligibility of students for taking part into the admission test shall be determined and guided as per rules of the University.

Admission Test:
Procedures for admission test shall be guided by the rules of the University. Along with that a student will be considered eligible for admission if he/she obtains minimum 30% marks in Physics and minimum 40% marks in Mathematics. Information relating to the detail syllabus, type & format of questions, date, time and place of the admission test will be found in the prospectus, daily news papers and also available on the web site http://www.juniv.edu/iit/

Selection Procedure:
Selection procedure shall be guided as per rules of the University.

Rules for Admission:
Procedures for admission shall be guided as per rules of the University.

Tuition & Other Fees:
Tuition fees and the mode of payment for four years program shall be guided as per rules of the university.

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Course Offering and Instruction:
The courses to be offered in a particular semester are announced and published in the Registration Package along with the tentative semester schedule before the end of the previous semester. The courses to be offered in any semester will be decided by the Committee of Courses for Undergraduate Program. Each course is conducted by a course teacher who is responsible for maintaining the expected standard of the course and for the assessment of students’ performance. One of the course teachers or any other member of the teaching staff of the Institute will be designated as course coordinator for each semester. He/she has the full responsibility for coordinating the work of the other members of the Institute involving in that semester.

Course Pattern and Credit Structure:
The undergraduate program is covered by a set of theoretical courses along with a set of laboratory courses to support them.

Course Designation and Numbering System:
A course will be represented by course number, course title, credit hours and contact hours per week (Theory or Lab). Each course is designated by a three two letter code identifying the B. Sc. program offered followed by a four-digit number having the following interpretation: The first and second digits correspond to the year and the semester in which the course is normally taken by the students. The third digit is reserved for maintaining continuity. The last digit is an odd number for theoretical courses and an even number for laboratory courses.

The following example illustrates a course representation system:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hrs</th>
<th>Class Hr/ Week</th>
</tr>
</thead>
<tbody>
<tr>
<td>IT 1101</td>
<td>Information Technology Fundamentals</td>
<td>3</td>
<td>3 hrs.</td>
</tr>
</tbody>
</table>

Assignment of Credits:
The assignment of credits to a theoretical course follows a different rule from that of a practical or laboratory course. Courses of study for the B.Sc. (Hons.) in Information Technology are defined as per rules of the University.
Credit Hour Requirement:
The total contact hours for each 3 credit, Theoretical course is 45 hours and for each 1.5 credit Lab oriented course is 45 hours. Marks allocated for each course either theoretical or practical is 100. The evaluation of a course will be carried by taking tutorial examination and a final examination.

A student for the B.Sc. (Hons.) in Information Technology shall offer six to ten courses comprising of both theoretical and practical units in each semester. In the final semester (semester VIII) students have two options, each consisting of two courses. A student can choose any one of these two options to complete his/her degree as an IT major or Telecommunication major. A student will have to complete total 158 credit-hours of course of study during the four years’ undergraduate program.

Industrial/Professional Training Requirements:
There shall be an Industrial/Professional training requirements at the end of fourth semester. The objective of the training program is to enlighten the students with practical orientation and give them an opportunity to make use of their theoretical concepts and practical skills in real life situations. All students will be placed in public and private sectors, particularly those organizations that are engaged in activities having direct relevance to the Information Technology and likely to enhance the knowledge and skill of the students. The training program shall extend over a period of minimum three weeks. The outcome of this program will be an Industrial/Professional training Report as prescribed in the syllabus. Training program shall be equivalent to a two credit hours laboratory course and shall be evaluated by this final report accordingly. The credit earned in this training program will not contribute the GPA/CGPA of the student but the student has to obtain a satisfactory (S) grade in this course to be promoted to the next semester.

Placement of Students for Thesis/Project Works:
The academic committee of the Institute shall arrange for the placement of students and shall nominate internal and external supervisor(s) of the students going for Industrial Attachment. The Director of the Institute will send the names of the internal and external supervisors to the Director Controller of the Examination office for appointment.

Thesis/Project Works:
Thesis/Project work is required for the partial fulfillment of the completion of bachelor degree. A Committee shall be formed for monitoring the project works for undergraduate students. This committee will finalize the placement of students for Project and shall nominate supervisor, internal and external members. The Director of the Institute will send the names of the internal and external members to the Controller Director of the Examination office for appointment.

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Placement of Students for Thesis/Project Works:
A student may apply for the evaluation of his/her project work after completing the minimum theoretical course works and CGPA required. The Committee for monitoring project works will finalize the Board of Examiners for the Project. The Board will consist of the director of the Institute, Supervisor(s), internal (minimum of two) and external members who will be an expert on the related fields.

Assessment:
For the purpose of Assessment, 100 marks shall be assigned to each three-credit hours’ course. Assessment of a student in a course shall be based on marks obtained in the course-end examination (written) and class assessments/continuous assessment. Marks allotted for class assessment/continuous assessment shall be 40% of the total earn marked for each theoretical course and 60% for each practical course.

Marks Distribution:

<table>
<thead>
<tr>
<th>Course Type</th>
<th>Class/Continuous Assessment</th>
<th>Final Examination</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Theoretical Courses</td>
<td>40%</td>
<td>60%</td>
<td></td>
</tr>
<tr>
<td>Practical Courses</td>
<td>60%</td>
<td>40%</td>
<td></td>
</tr>
</tbody>
</table>

Class Assessment/Continuous Assessment and Submission of Assessment:
Class assessment/Continuous assessment will consist of class attendance, written class tests, quizzes, project works, case studies, assignments, term papers and discussion sessions. For assessment of class test in theoretical courses there shall be a minimum of two tutorial tests (declared/undeclared) for each three-credit hours course. For assessment of class test in practical courses there shall be a minimum of two declared written tutorial tests for each three-credit hours’ course. The distribution of marks for each theoretical course shall be as follows:

<table>
<thead>
<tr>
<th>Theoretical Courses</th>
<th>Class participation / Attendance</th>
<th>Assignments, Term papers or other forms of assessment</th>
<th>Tutorial tests/Class tests</th>
<th>Semester-end Examination</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>10%</td>
<td>10%</td>
<td>20%</td>
<td>60%</td>
<td>100%</td>
</tr>
</tbody>
</table>

The distribution of marks for each practical course will be as follows:
Practical Courses

<table>
<thead>
<tr>
<th>Practical Courses</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class participation / Attendance</td>
<td>10%</td>
</tr>
<tr>
<td>Class test / Tutorial</td>
<td>20%</td>
</tr>
<tr>
<td>Experiment Evaluation</td>
<td>10%</td>
</tr>
<tr>
<td>Report</td>
<td>10%</td>
</tr>
<tr>
<td>Quiz / Viva</td>
<td>10%</td>
</tr>
<tr>
<td>Semester-end Examination</td>
<td>40%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>

Examinations:
Final examination for each semester will be conducted as per Examination Ordinance for semester system in the university and controlled by Office of the Controller of Examination.

Grading System:
The Universal Grading System introduced by the University Grant Commission (UGC) of Bangladesh, will be followed which are given below. The total numerical marks obtained by a student in each course will be converted into Letter Grade (LG) and Grade Point (GP). According to the Grade Point, the GPA (Grade Point Average) and CGPA (Cumulative Grade Point Average) will be calculated. The conversion of Letter Grade and Grade Point will be as follows:

<table>
<thead>
<tr>
<th>Numerical Grade</th>
<th>Letter Grade</th>
<th>Grade Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>80% and above</td>
<td>A+</td>
<td>4.00</td>
</tr>
<tr>
<td>75% to less than 80%</td>
<td>A</td>
<td>3.75</td>
</tr>
<tr>
<td>70% to less than 75%</td>
<td>A-</td>
<td>3.50</td>
</tr>
<tr>
<td>65% to less than 70%</td>
<td>B+</td>
<td>3.25</td>
</tr>
<tr>
<td>60% to less than 65%</td>
<td>B</td>
<td>3.00</td>
</tr>
<tr>
<td>55% to less than 60%</td>
<td>B-</td>
<td>2.75</td>
</tr>
<tr>
<td>50% to less than 55%</td>
<td>C+</td>
<td>2.50</td>
</tr>
<tr>
<td>45% to less than 50%</td>
<td>C</td>
<td>2.25</td>
</tr>
<tr>
<td>40% to less than 45%</td>
<td>D</td>
<td>2.00</td>
</tr>
<tr>
<td>Less than 40%</td>
<td>F</td>
<td>0.00</td>
</tr>
<tr>
<td>Incomplete</td>
<td>I</td>
<td></td>
</tr>
<tr>
<td>Satisfactory or Unsatisfactory</td>
<td>S or U</td>
<td>For Thesis, Industrial/ Professional Tanning etc.</td>
</tr>
<tr>
<td>Continuation</td>
<td>X</td>
<td>For Thesis, Industrial Attachment etc.</td>
</tr>
</tbody>
</table>

Earned Credits:
1. The grades of the courses, in which a student has obtained minimum qualifying pass grade, shall only be counted as credits earned by him/her. Other grades shall not be counted for Grade Point Average (GPA) calculation.

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2. If a student obtains an F grade in any course in any semester, he/she shall have to repeat the course(s), whenever offered within his/her total duration of academic years. In that case his/her earned credit shall not be more than B.

3. If a student obtains a grade I (incomplete) in one or more courses in any semester, he/she shall have to repeat the course(s), whenever offered within his total duration of academic years.

Performance Evaluation:
The performance of a student will be evaluated in terms of two indices: (i) semester grade point average (GPA) and (ii) Cumulative Grade Point Average (CGPA) which is the grade point average for all the semester completed.

Students will be considered to be making normal progress toward a degree if their Cumulative Grade Point Average (CGPA) for all work attempted is 2.00 or higher. Students who regularly maintain a GPA of 2.00 in each semester or better are making good progress toward the degrees and are in good standing with the University. Students who fail to maintain this minimum rate of progress will not be in good standing. This can happen when any one of the following conditions exists. The earned GPA in each semester falls below 2.00, or The Cumulative GPA falls below 2.00, or The earned number of credits falls below 15 times the number of semester attended.

All such students can make up their deficiencies in GPA and credit requirements by completing courses in the subsequent semester(s) and backlog courses, if there are any, with better grades. When the minimum GPA and credit requirements are achieved, the student is again returned to good standing.

Class Attendance:
To sit for the class assessment and course-end examination, a student must have to have minimum class attendance which will be guided by the rules of the university.

Qualifying Marks:
1. The qualifying pass grade in a particular course will be determined by the rules of the University. If any student gets F grade in one or more courses, he/she has to cover it within the time limit which is mentioned in section 19 of this ordinance.

2. If a candidate remains absent in a course-end Examination for a course for such reasons as serious illness, accident, or any valid reason, his/her course may be graded I (Incomplete). With subject to the approval of the concern authority of the University, he/she may get a chance to recover it like section 19.

Promotion to next semester:
A student must secure the minimum qualifying grade in each of the courses in the semester-end examination in order to be considered “pass” in that semester.
However, for promotion to the next semester, a candidate shall have to obtain a minimum GPA which will be followed as per University rules.

**Referred Examination:**
Matters relating to referred examination shall be guided by the rules of the University.

**Student Adviser:**
One adviser is normally appointed for a group of students by the Director of the Institute. The adviser advises each student about the academic program of that particular semester. However, it is also the student’s responsibility to keep regular contact with his/her adviser who will review and eventually approve the student’s specific plan of study and monitor subsequent progress of the student. The adviser is also authorized to permit the student to drop one or more courses based on his/her previous academic performance and corresponding categorization.

**Time Limit:**
How long a student shall be permitted to continue as a Bachelor’s Degree candidate will be decided by the rules of the University.

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### Syllabus for B.Sc. (Hons.) in Information Technology

#### COURSE CURRICULUM FOR

**B. SC. (HONS.) IN INFORMATION TECHNOLOGY**

<table>
<thead>
<tr>
<th>First Year First Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SL</strong></td>
</tr>
<tr>
<td>1</td>
</tr>
<tr>
<td>2</td>
</tr>
<tr>
<td>3</td>
</tr>
<tr>
<td>4</td>
</tr>
<tr>
<td>5</td>
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<tr>
<td>6</td>
</tr>
<tr>
<td>7</td>
</tr>
<tr>
<td>8</td>
</tr>
<tr>
<td><strong>Total Credit</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>First Year Second Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SL</strong></td>
</tr>
<tr>
<td>1</td>
</tr>
<tr>
<td>2</td>
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<tr>
<td>3</td>
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<tr>
<td>4</td>
</tr>
<tr>
<td>5</td>
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<tr>
<td>6</td>
</tr>
<tr>
<td>7</td>
</tr>
<tr>
<td>8</td>
</tr>
<tr>
<td><strong>Total Credit</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Second Year First Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SL</strong></td>
</tr>
<tr>
<td>1</td>
</tr>
<tr>
<td>2</td>
</tr>
<tr>
<td>3</td>
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<tr>
<td>4</td>
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<tr>
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<tr>
<td>6</td>
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<td>7</td>
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<tr>
<td>8</td>
</tr>
<tr>
<td>9</td>
</tr>
<tr>
<td><strong>Total Credit</strong></td>
</tr>
</tbody>
</table>
### Second Year Second Semester

<table>
<thead>
<tr>
<th>SL</th>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hrs</th>
<th>Class Hr/ Week</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>IT 2201</td>
<td>Information System Analysis</td>
<td>3</td>
<td>3 hrs.</td>
</tr>
<tr>
<td>2</td>
<td>IT 2203</td>
<td>Digital Logic Design</td>
<td>3</td>
<td>3 hrs.</td>
</tr>
<tr>
<td>3</td>
<td>IT 2205</td>
<td>Data Communication</td>
<td>3</td>
<td>3 hrs.</td>
</tr>
<tr>
<td>4</td>
<td>IT 2207</td>
<td>Discrete Math</td>
<td>3</td>
<td>3 hrs.</td>
</tr>
<tr>
<td>5</td>
<td>IT 2209</td>
<td>Computational Mathematics</td>
<td>3</td>
<td>3 hrs.</td>
</tr>
<tr>
<td>6</td>
<td>IT 2202</td>
<td>Information System Analysis Lab</td>
<td>1.5</td>
<td>3 hrs.</td>
</tr>
<tr>
<td>7</td>
<td>IT 2204</td>
<td>DLD Lab</td>
<td>1.5</td>
<td>3 hrs.</td>
</tr>
<tr>
<td>8</td>
<td>IT 2210</td>
<td>Computational Mathematics Lab</td>
<td>1.5</td>
<td>3 hrs.</td>
</tr>
<tr>
<td>9</td>
<td>IT 2200</td>
<td>Special Study (Industrial Tour) and Viva</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

Total Credit: 20.5

### Third Year First Semester

<table>
<thead>
<tr>
<th>SL</th>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hrs</th>
<th>Class Hr/ Week</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>IT 3101</td>
<td>Database Management System</td>
<td>3</td>
<td>3 hrs.</td>
</tr>
<tr>
<td>2</td>
<td>IT 3103</td>
<td>Computer Network and Internet Technology</td>
<td>3</td>
<td>3 hrs.</td>
</tr>
<tr>
<td>3</td>
<td>IT 3105</td>
<td>Signal and System</td>
<td>3</td>
<td>3 hrs.</td>
</tr>
<tr>
<td>4</td>
<td>IT 3107</td>
<td>Operating System</td>
<td>3</td>
<td>3 hrs.</td>
</tr>
<tr>
<td>5</td>
<td>IT 3109</td>
<td>Simulation and Modeling</td>
<td>3</td>
<td>3 hrs.</td>
</tr>
<tr>
<td>6</td>
<td>IT 3102</td>
<td>Database Management System Lab</td>
<td>1.5</td>
<td>3 hrs.</td>
</tr>
<tr>
<td>7</td>
<td>IT 3104</td>
<td>Computer Network and Internet Technology Lab</td>
<td>1.5</td>
<td>3 hrs.</td>
</tr>
<tr>
<td>8</td>
<td>IT 3106</td>
<td>Signal and System Lab</td>
<td>1.5</td>
<td>3 hrs.</td>
</tr>
<tr>
<td>9</td>
<td>IT 3100</td>
<td>Viva</td>
<td>0.5</td>
<td></td>
</tr>
</tbody>
</table>

Total Credit: 20.0

### Third Year Second Semester

<table>
<thead>
<tr>
<th>SL</th>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hrs</th>
<th>Class Hr/ Week</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>IT 3201</td>
<td>Software Engineering</td>
<td>3</td>
<td>3 hrs.</td>
</tr>
<tr>
<td>2</td>
<td>IT 3203</td>
<td>Computer Graphics</td>
<td>3</td>
<td>3 hrs.</td>
</tr>
<tr>
<td>3</td>
<td>IT 3205</td>
<td>Web Technologies</td>
<td>3</td>
<td>3 hrs.</td>
</tr>
<tr>
<td>4</td>
<td>IT 3207</td>
<td>Microprocessor and Interfacing</td>
<td>3</td>
<td>3 hrs.</td>
</tr>
<tr>
<td>5</td>
<td>IT 3209</td>
<td>Introduction to Bio-informatics</td>
<td>3</td>
<td>3 hrs.</td>
</tr>
<tr>
<td>6</td>
<td>IT 3202</td>
<td>Software Engineering Lab</td>
<td>1.5</td>
<td>3 hrs.</td>
</tr>
<tr>
<td>7</td>
<td>IT 3204</td>
<td>Computer Graphics Lab</td>
<td>1.5</td>
<td>3 hrs.</td>
</tr>
<tr>
<td>8</td>
<td>IT 3206</td>
<td>Web Programming Lab</td>
<td>1.5</td>
<td>3 hrs.</td>
</tr>
<tr>
<td>9</td>
<td>IT 3208</td>
<td>Microprocessor and Interfacing Lab</td>
<td>1.5</td>
<td>3 hrs.</td>
</tr>
<tr>
<td>10</td>
<td>IT 3200</td>
<td>Viva</td>
<td>0.5</td>
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</tr>
</tbody>
</table>

Total Credit: 21.5

### Fourth Year First Semester

<table>
<thead>
<tr>
<th>SL</th>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hrs</th>
<th>Class Hr/ Week</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>IT 4101</td>
<td>Artificial Intelligences &amp; Neural Networks</td>
<td>3</td>
<td>3 hrs.</td>
</tr>
<tr>
<td>2</td>
<td>IT 4103</td>
<td>Telecommunication Systems</td>
<td>3</td>
<td>3 hrs.</td>
</tr>
<tr>
<td>3</td>
<td>IT 4105</td>
<td>Management Information System</td>
<td>3</td>
<td>3 hrs.</td>
</tr>
<tr>
<td>4</td>
<td>IT 4107</td>
<td>Parallel and Distributed System</td>
<td>3</td>
<td>3 hrs.</td>
</tr>
<tr>
<td>5</td>
<td>IT 4109</td>
<td>Multimedia Systems &amp; Application</td>
<td>3</td>
<td>3 hrs.</td>
</tr>
<tr>
<td>6</td>
<td>IT 4102</td>
<td>Artificial Intelligences &amp; Neural Networks Lab</td>
<td>1.5</td>
<td>3 hrs.</td>
</tr>
<tr>
<td>7</td>
<td>IT 4104</td>
<td>Telecommunication Systems Lab</td>
<td>1.5</td>
<td>3 hrs.</td>
</tr>
<tr>
<td>8</td>
<td>IT 4100</td>
<td>Viva +Thesis/Project Proposal</td>
<td>2.0</td>
<td></td>
</tr>
</tbody>
</table>

Total Credit: 20.0

### Fourth Year Second Semester

<table>
<thead>
<tr>
<th>SL</th>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hrs</th>
<th>Class Hr/ Week</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>IT 4201</td>
<td>Human Computer Interfacing</td>
<td>3</td>
<td>3 hrs.</td>
</tr>
<tr>
<td>2</td>
<td>IT 4203</td>
<td>Wireless &amp; Mobile Communication</td>
<td>3</td>
<td>3 hrs.</td>
</tr>
<tr>
<td>3</td>
<td>IT 42XX</td>
<td>From Option-I</td>
<td>3</td>
<td>3 hrs.</td>
</tr>
<tr>
<td>4</td>
<td>IT 42XX</td>
<td>From Option-II</td>
<td>3</td>
<td>3 hrs.</td>
</tr>
<tr>
<td>5</td>
<td>IT 42XX</td>
<td>Option-I/Option II</td>
<td>3</td>
<td>3 hrs.</td>
</tr>
<tr>
<td>6</td>
<td>IT 4299</td>
<td>Thesis/Project</td>
<td>3</td>
<td>6 hrs.</td>
</tr>
<tr>
<td>7</td>
<td>IT 4200</td>
<td>Viva</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

Total Credit: 19.0

#### Option I

<table>
<thead>
<tr>
<th>SL</th>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hrs</th>
<th>Class Hr/ Week</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>IT 4221</td>
<td>Embedded System Design</td>
<td>3</td>
<td>3 hrs.</td>
</tr>
<tr>
<td>2</td>
<td>IT 4223</td>
<td>Speech Processing and Speech Recognition</td>
<td>3</td>
<td>3 hrs.</td>
</tr>
<tr>
<td>3</td>
<td>IT 4225</td>
<td>Digital Image Processing and Pattern Recognition</td>
<td>3</td>
<td>3 hrs.</td>
</tr>
<tr>
<td>4</td>
<td>IT 4227</td>
<td>Mobile application development</td>
<td>3</td>
<td>3 hrs.</td>
</tr>
<tr>
<td>5</td>
<td>IT 4229</td>
<td>Neuroinformatics</td>
<td>3</td>
<td>3 hrs.</td>
</tr>
<tr>
<td>6</td>
<td>IT 4231</td>
<td>Object Oriented Software Engineering</td>
<td>3</td>
<td>3 hrs.</td>
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</table>

#### Option II

<table>
<thead>
<tr>
<th>SL</th>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hrs</th>
<th>Class Hr/ Week</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>IT 4251</td>
<td>Digital Communication Systems</td>
<td>3</td>
<td>3 hrs.</td>
</tr>
<tr>
<td>2</td>
<td>IT 4253</td>
<td>Digital Signal Processing</td>
<td>3</td>
<td>3 hrs.</td>
</tr>
<tr>
<td>3</td>
<td>IT 4255</td>
<td>E-commerce &amp; E-governance</td>
<td>3</td>
<td>3 hrs.</td>
</tr>
<tr>
<td>4</td>
<td>IT 4257</td>
<td>Cryptography</td>
<td>3</td>
<td>3 hrs.</td>
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<tr>
<td>5</td>
<td>IT 4259</td>
<td>Computer Network Security</td>
<td>3</td>
<td>3 hrs.</td>
</tr>
<tr>
<td>6</td>
<td>IT 4261</td>
<td>Optical Fiber Communication</td>
<td>3</td>
<td>3 hrs.</td>
</tr>
</tbody>
</table>
IT 1101: Information Technology Fundamentals
Introduction to computations: early history of computing devices; computers; major components of a computer; Hardware: processor, memory, I/O devices; software: Operating system, application software; Basic architecture of a computer; Basic Information Technology; the Internet. Basic programming concepts: Number system: binary, octal, hexadecimal, decimal; binary arithmetic, program development stages, flow charts, programming constructs: data types, operators, expressions, statements, control statements, functions, array.
Suggested Texts:
1. Introduction to Information Technology, Pearson Education, ITL Education Solutions Ltd.
2. Computer and Information Processing- William M. Fouri
3. Introduction to Computer- Peter Norton
4. Computers Today – Suresh K Basandra
7. IT for management: Making connection for strategic Advantage.

IT 1103: Introduction to Programming Environment
History of Programming Languages; Programming Environment; Compiler and Interpreter; Structural Programming concepts: Programming fundamentals, data types, operators, expressions, control structures; Functions and program structure, Header files; Preprocessor; Pointers and arrays; Strings, multidimensional array, User defined data types; Input and Output, file access; Variable length argument list; Command line parameters; Error Handling; Graphics, Linking, library functions.
Suggested Texts:
1. Programming with C- Byron Gottfried (Schaum’s Outline Series)
3. How to Program- Deitel / Deitel, C (Prentice Hall)
4. Problem solving and Progamming- Barclay, ANSI C (Prentice Hall)
5. Programming in ANSI C- E Balagurusamy

IT 1104: Structured Programming Lab
Syllabus based on IT 1103

IT 1105: Electrical Circuits

IT 1106: Electrical Circuits Lab
Syllabus based on IT 1105

IT 1107: Differential and Integral Calculus
Matrices: Introduction, Determination, Inverse of a matrix, Rank of a Matrix, Eigen value Problems. Differential Calculus: Limits, continuity and differentiability; Successive differentiation of various types of functions; Leibnitz’s Theorem; Roole’s Theorem; Mean valueTheorem in finite and infinite forms; Lagrange’s form of remainders; Cauchy’s form of remainder; Expansion of functions; Evaluation of indeterminate forms by L’Hospitals rule; Patial differentiation; Euler’s Theorem; Tangenent and Normal, Subtangent and subnormal in Cartesian and polar co-ordinates; Maximum and minimum values of functions of single variable.
Integral Calculus: Definitions of integration; Integration by the method of substitutions; Integration by parts; Standard integrals; Integration by the method of successive reduction; Definite integrals and its properties and use in summing series; Walli’s formula, Improper integrals, Beta function and Gamma function; Area under a plane curve in Cartesian and polar co-ordinates; Trapezoidal rule, Simpson’s rule, arc lengths of curves in Cartesian and polar co-ordinates, parametric and pedal equations.
Suggested Texts:
1. Differential and Integral Calculus, Vol. 2 by Richard Courant, Edward James McShane and Sloan
2. Schaum’s Outline of Theory and Problems of Differential and Integral Calculus (Schaums Outline Series) by Frank Ayres and Elliott Mendelson
3. Calculus by Howard Anton, Irl C. Bivens and Stephen Davis

IT 1109: Communicative English
LANGUAGE: imperative verbs- common past simple verbs - basic question forms and short answers- can for ability and possibility- like and would like - subject - verb - object word order- possessive pronouns and ‘s- adverbs of frequency (sometimes, always)- like +ing- irregular past simple verbs- the present perfect simple with ever - going to for future plans- Modal verbs: have to for obligation, should for advice, could / might / must / can’t for possibility- too / (not) enough- subject questions (e.g. Who gave it to you?)- the present continuous for future arrangements- can / can’t for permission- the present perfect simple and continuous with for and since- the first and second conditional- used to- so / neither-reported speech with say and tell the past continuous for unfulfilled promises (I was going to…),-, reported speech - statements, commands and questions, say vs. tell- tag questions- if only / I wish + past perfect- if and unless- verbs which can be transitive or intransitive- verb + (to) infinitive or –ing- defining relative clauses- could and be able to - Modal and semi-modal verbs: could / might / will / needn't have and didn’t need to, had better- used to and would -ed and –ing adjectives (amazed / amazing)- make and let-be used to and get used to- would rather / prefer- look and look like, feel like – conditionals.
SPEAKING: ask and answer simple questions on familiar topics and about personal details- make and respond to simple statements- describe yourself, your family and where you live- describe your hobbies and interests in a simple way- make simple transactions in shops, post offices or banks- asking for basic information and buying tickets- ask for and give directions referring to a map or plan- make and accept apologies- ask for attention- show that you understand what’s being said to you - discuss with others where to go and what to do and make arrangements- describe your educational background and your job- deal with most situations when making travel arrangements or travelling- express and respond to feelings.
such as surprise, happiness, sadness, interest or indifference - give or seek personal opinions- agree or disagree with someone politely- narrate a story- give detailed accounts of experiences, describing feelings and reactions- describe dreams, hopes and ambitions- relate the plot of a book or film and describe your reactions.

READING: Reading comprehension - reading articles taken from the journals, newspapers – answering different types of questions based on comprehensions – helping in learning to read English texts easily and with full understanding.

LISTENING: listening exercise to enhance the ability to understand announcements, lectures and other interactive messages in audio format.

WRITING: learning how to compose an academic writing with proper development of the theme – how to develop ideas in an essay.

Suggested Texts:

1. Cliff’s TOEFL(for practice of different skills)
2. Practical English Usage by Michael Swan

**YEAR I: SEMESTER 2**

**TOTAL CREDIT: 18.5**

**IT 1201: Data Structures**

Internal data representation; Abstract data types; Elementary data structures: arrays, lists, stacks, queues, trees, graphs; Advanced data Structures: heaps, Fibonacci heaps, B-trees; Recursion, sorting, searching, hashing, storage management.

**Suggested Texts:**

1. Data Structure and Algorithm- Schaum’s Outline Series
2. Fundamentals of Data Structures- Horowitz E. and Sahni, S Galgotia
3. Data Structures and Program Design in C- Kruse/Tondo/Leung (Prentice-Hall)
4. Wirth N, Algorithms + Data Structures= Programs, Prentice Hall

**IT 1202: Data Structures Lab**

Syllabus based on IT 1201

**IT 1203 Object Oriented Programming**

Features of Object Oriented Languages, Procedural vs. Object Oriented, Data Abstraction, Encapsulation, Inheritance, Polymorphism, Effects of OO Approach, Basic OO Design classes and encapsulation, constructors & destructors, Dynamic Memory Allocation, Pointers to Classes, I/O STREAM, overloading operators, constants, scope, & linkage, inheritance, polymorphism and dynamic binding, class and function templates.

**Suggested Texts:**

1. Head First Java, Kathy Sierra and Bert Bates, O’reilly publication
2. Object Oriented Programming with C++ - E. Balagurusamy
3. Java -The Complete Reference – Herbert Schildt
4. Programming in C++ by Balagurusamy TMH.
5. Complete JAVA reference by Patrick Naughton.

**IT 1204: Object Oriented Programming Lab**

Syllabus based on IT 1203

**IT 1205: Complex Variable and Vector Algebra**

**Vector Algebra:** Scalars and vectors, equality of vectors; Addition and subtraction of vectors; Multiplication of vectors by scalars; Scalar and vector product of two vectors and their geometrical interpretation; Triple products and multiple products; Linear dependence and independence of vectors.

**Complex Variable:** Complex number system; General functions of a complex variable; Limits and continuity of a function of complex variable and related theorems; Complex differentiation and the Cauchy Riemann Equations; Mapping by elementary functions; Line integral of a complex function; Cauchy’s Integral Theorem; Cauchy’s Integral Formula; Liouville’s Theorem; Taylor’s Theorem and Laurent’s Theorem. Singular points; Residue; Cauchy’s Residue Theorem. Evaluation of residues; Contour integration; Conformal mapping.

**Suggested Texts:**

2. Stewart and D. Tall, "Complex Analysis: (the hitchhiker's guide to the plane)", Cambridge University Press.


IT 1207: Economics
Definition of Economics; Economics and engineering; Principles of economics.

Micro-Economics: Introduction to various economic systems - capitalist, command and mixed economy; Fundamental economic problems and the mechanism through which these problems are solved; Theory of demand and supply and their elasticities; Theory of consumer behavior; Cardinal and ordinal approaches of utility analysis; Price determination; Nature of an economic theory; Applicability of economic theories to the problems of developing countries; Indifference curve techniques; Theory of production, production function, types of productivity; Rational region of production of an engineering firm; Concepts of market and market structure; Cost analysis and cost function; Small scale production and large scale production; Optimization; Theory of distribution; Use of derivative in economics: maximization and minimization of economic functions, relationship among total, marginal and average concepts.

Macro-economics: Savings; investment, employment; National income analysis; Inflation; Monetary policy; Fiscal policy and trade policy with reference to Bangladesh; Economics of development and planning.

Suggested Texts:
1. Basic Economics (3rd Ed.)- Thomas Sowell
2. Economics in One Lesson- Henry Hazlitt
3. Economics For Dummies- Sean Masaki Flynn

IT 1209: Accounting:
Financial Accounting: Objectives and importance of accounting; Accounting as an information system; computerized system and applications in accounting. Recording system: double entry mechanism; accounts and their classification; Accounting equation; Accounting cycle: journal, ledger, trial balance; Preparation of financial statements considering adjusting and closing entries; Accounting concepts (principles) and conventions.

Financial statement analysis and interpretation: ratio analysis.

Cost and Management Accounting: Cost concepts and classification; Overhead cost: meaning and classification; Distribution of overhead cost; Overhead recovery method/rate; Job order costing; preparation of job cost sheet and quotation price; Inventory valuation: absorption costing and marginal/variable costing technique; Cost-Volume-Profit analysis: meaning, breakeven analysis, contribution margin approach, sensitivity analysis.


Suggested Texts:
1. Accounting for Non-Accountants- Wayne Label
2. Basic Accounting Concepts, Principles and Procedures- Gregory R Mostyn
3. Schaum’s Outline of Principles of Accounting- Joel Lernel & James Cashin

IT 1205: Electronic Devices and Circuits
Introduction to semiconductors, p-type and n-type semiconductors; p-n junction diode characteristics; Diode applications: half and full wave rectifiers, clipping and clamping circuits, regulated power supply using zener diode.

Bipolar Junction Transistor (BJT): principle of operation, I-V characteristics; Transistor circuit configurations (CE, CB, CC), BJT biasing, load lines; BJTs at low frequencies; Hybrid model, h parameters, simplified hybrid model; Small-signal analysis of single and multi-stage amplifiers, frequency response of BJT amplifier.

Field Effect Transistors (FET): principle of operation of JFET and MOSFET; Depletion and enhancement type NMOS and PMOS; biasing of FETs; Low and high frequency models of FETs, Switching circuits using FETs; Introduction to CMOS.

Operational Amplifiers (OPAMP): linear applications of OPAMPS, gain, input and output impedances, active filters, frequency response and noise. Introduction to feedback, Oscillators, Silicon Controlled Rectifiers (SCR), TRIAC, DIAC and UJT: characteristics and applications; Introduction to IC fabrication processes.

Suggested Texts:

IT 2106: Electronic Devices and Circuits
Syllabus based on IT 2105

IT 2107: Ordinary and Partial differential Equations
Ordinary Differential Equation: Simultaneous first order linear equations with constant coefficients - Linear equations of second order with constant and variable coefficients, Homogeneous equation of Euler type, equations reducible to homogeneous form, Method of reduction of order - Method of variation of parameters. Partial Differential Equations: Formation, Solutions of standard types of first order equations, Lagrange's Linear equation, Linear partial, differential equations of second and higher order with constant coefficients.

Fourier Analysis: Real and complex form of Fourier series; Finite transform; Fourier Integral; Fourier transforms and their uses in solving boundary value problems of wave.

Laplace Transforms: Definition; Laplace transforms of some elementary functions; Sufficient conditions for existence of Laplace transforms; Inverse Laplace transforms; Laplace transforms of derivatives. The unit step function; Periodic function; Some special theorems on Laplace transforms; Partial fraction; Solutions of differential equations by Laplace transforms; Evaluation of improper integrals.

Suggested Texts:
1. Calculus by James Stewart
2. Calculus by Frank Ayres, Elliott Mendelson
4. The Laplace Transform: Theory and Applications (Undergraduate Texts in Mathematics) by Joel L. Schiff
5. Complex Variables and the Laplace Transform for Engineers by Wilbur R. LePage
6. Differential Equations by Paul Blanchard, Robert L. Devaney, Glen R. Hall
7. Fourier Analysis by T. W. Körner
8. Partial Differential Equations By Lawrence C. Evans

IT 2109: Statistics & Probability Theory
Elements of Statistics: Nature and scope of statistics; Attributes and variables; discrete and continuous variables; Method of data collection; Measures of location: Arithmetic mean; Harmonic mean; Median; Mode; Quartiles; Deciles; Percentiles.

Measure of dispersion: Characteristics of an ideal measure: Absolute & Relative measures; Range; Standard deviation; Mean deviation; Quartile deviation; Coefficient of dispersion; Coefficient of variation; Skewness and kurtosis. Elements of Probability: Meaning and definition of probability; A priori and a posteriori probability; Basic terminology of probability; Random variables; Probability function; Expectation of sum and products. Regression and correlation: Relationship between variables; Fitting of regression lines; Simple correlation; Multiple correlation and regression. Tests of Significance: Tests of means, Variance, Correlation coefficient and regression coefficient. Probability Distribution: Concept of Stochastic process, Discrete distribution; Continuous distribution; Normal distribution; Poisson distribution; Exponential distribution; Continuous distribution; Normal distribution; Poisson distribution; Exponential distribution; Binomial distribution; Bernoulli distribution; Hypergeometric distribution; Geometric distribution; Negative binomial distribution; Uniform distribution; Beta distribution; Gamma distribution; Chi-square distribution; Student’s t distribution; F distribution.

Suggested Texts:

IT 2201: Information System Analysis


Suggested Texts:
1. Martin Fowler, Kendall Scott, “UML Distilled - Applying the standard object modeling language”, Addison Wesley
2. Richard C Lee, William M Tepfenhart, "UML and C++ - A practical guide to object oriented development", PH

IT 2202: Information System Analysis Lab
Syllabus based on IT 2201

IT 2203: Digital Logic Design

Suggested Texts:

IT 2204: Digital Logic Design Lab
Syllabus based on IT 2203
IT 2205: Data Communication
Data communication networks: standards, ISO reference model, internal architecture, protocol implementation issues, transmission media, attenuation and distortion, limited bandwidth, signal types, propagation delay, public carrier circuits, modulation, multiplexing, physical layer interfacing standards
Data transmission basics: transmission modes, asynchronous and synchronous transmission, bit - character and frame synchronization, coding, error detection methods, parity, block sum check, cyclic redundancy check, data compression, Huffman coding, dynamic Huffman coding, facsimile compression, transmission control circuits, communication control devices
Protocol basics: error control, stop-and-wait & sliding window protocol, link utilization, selective repeat and go-back-N - link management
Frame relay and ATM networks: Frame relay operation, layers and traffic control; ATM networks, Architecture switching, layers service classes.
Local Area Network: LAN topology, Ethernet, Token bus, Token ring, FDDI, Wireless LAN, ATM LAN, IEEE 802 Medium access control layer standard, Random access protocols, ALOHA, Slotted ALOHA.

Suggested Texts:
1. William Stallings, Data and Computer Communications, PHI
3. Halsall F., Data Communication, Computer Networks and Open Systems, Addison Wesley
5. Bertsekas & Gallagar, Data Networks, PHI

IT 2206: Data Communication Lab
Syllabus based on IT 2205

IT 2207 Discrete Mathematics
Mathematical logic: Introduction, prepositional calculus, basic logical operations, Tautologies, Contradiction, Argument, Mathematical Reasoning, Method of proof, Counting, Predicate calculus.
Relations: Binary Relations, Set operation on relations, Types of Relations, Partial order relation, Equivalence relation, Composition of relations, Functions, Composition of functions.
Graph Theory: Basic terminology, paths, cycle & Connectivity, Sub graphs, Types of graphs, Representation of graphs in computer memory, Trees, Properties of trees, Binary trees, Tree traversing, Spanning Trees, Computer Representation of general trees. Planner Graph, Graph Coloring

Suggested Texts:
1. Kenneth H. Rosen, Discrete Mathematics and Applications
2. Knuth, Concrete Mathematics
3. Nicodemi O CBS, Discrete Mathematics

IT 2209: Computational Mathematics
Computer Arithmetic: floating point representation of numbers, arithmetic operations with normalized floating point numbers; Iterative methods: different iterative methods for finding the roots of an equation and their computer implementation; Solution of simultaneous Algebraic Equations, Gauss elimination; Interpolation, Least square approximation of functions, Taylor series representation, Chebyshev series; Numerical differentiation and integration and Numerical Solution of Differential Equations.

Suggested Texts:
2. P. Balagurusamy and Techmadia,“Numerical Methods”.

IT 2210: Computational Mathematics Lab
Syllabus based on IT 2209
Institute of Information Technology, JU

YEAR III: SEMESTER 1
(TOTAL CREDIT: 21.5)

IT 3101: Database Management System

Suggested Texts:

IT 3102: Database Management System Lab
Syllabus based on IT 3101

IT 3103: Computer Network & Internet Technologies
Protocol hierarchies; Data link control: HDLC; DLL in Internet; DLM of ATM; LAN Protocols: Standards IEEE 802.11; Hubs, Bridges, and Switches, FDDI, Fast Ethernet; Routing algorithm; Congestion control; Internetworking, WAN; Fragmentation; Firewalls; IPv4, IPv6, ARP, RARP, Mobile IP, Network layer of ATM; Transport protocols; Transmission control protocol: connection management, transmission policy, congestion control, timer management; UDP; AAL of ATM; Network security: Cryptography, DES, IDEA, public key algorithm; Authentication; Digital signatures; Gigabit Ethernet; Domain Name System: Name servers; Email and its privacy; SNMP, HTTP, World Wide Web; Internetworking Server and Services: Server Implementation, Content Servers, Performance Servers, Database Servers, Mirrored Servers, Popular Server Products, Web Servers & Databases; Evolution of the World Wide Web, Web Browser Software, Using Browsers to Access Web Pages, Customizing your Browser, Images & Web Browsers, Wireless Web Protocols; Electronic Mail.

Suggested Texts:
1. William Stallings, Data and Computer Communications, PHI
2. Prakash C Gupta, Data Communications, PHI
5. Andrew S. Tanenbaum, Computer Networks, PHI

IT 3104: Computer Network & Internet Technologies Lab
Syllabus based on IT 3103

IT 3105: Signals and Systems
Syllabus for B.Sc. (Hons.) in Information Technology
Concept of signals, classifications of signals like continuous time, discrete time, even and odd signals, analog and digital signal, periodic and non periodic signal, deterministic and random signal, energy signal and power signal; some special types of signals like exponential, sinusoidal, impulse, unit step, ramp; time shifting , scaling, reflection of signal.
Concept of systems, properties of systems, memoryless system, invertibility, causality, linearity, moving average system, stability; linear time-invariant (LTI) systems: introduction, convolution, impulse response representation for LTI systems, properties of the impulse response representation for LTI systems; continuous time Fourier series and transform, discrete time Fourier transform and its properties, STFT, wavelet transform, z-transform: introduction, properties of the region of convergence; properties of the z-transform; inversion of the z-transform, transform analysis of LTI systems, FIR and IIR filters; random variable and random process with their applications.

Suggested Texts:
2. Simon Haykin, Signals and Systems

IT 3106: Signals and Systems Lab
Syllabus based on IT 3105

IT 3107: Operating System
Operating System: its role in computer systems; Operating system concepts; Operating system structure; Process: process model and implementation, Inter-Process Communication (IPC), classical IPC problems, process scheduling, multiprocess and time-sharing; Memory management: swapping, paging, segmentation, virtual memory; Input/Output: hardware, software, disk, terminals, clocks; Deadlock: resource allocation and deadlock, deadlock detection, prevention and recovery; File Systems: files, directories, security, protection; Case study of some operating systems.
Operating System: its role in computer system; Operating System concepts; Operating System structure; Process Management: Processes; Interprocess Communication ; Classical IPC Problems; CPU Scheduling; Process Synchronization; Deadlock; Storage Management: Memory Management; Virtual Memory; File-System ; Input/Output: Principle of I/O Hardware; Principle of I/O Software.

Suggested Texts:
3. N.G. J., Operating Systems-A Modern Perspective, Pearson Education Asia

IT 3108: Operating System Lab
Syllabus based on IT 3107

IT 3109: Simulation and Modelling
Simulation modeling basics: systems, models and simulation; Classification of simulation models; Steps in a simulation study; Concepts in discrete-event simulation: event-scheduling vs. process-interaction approaches, time-advance mechanism, organization of a discrete-event simulation model; Continuous simulation models; Combined discrete-continuous models; Monte Carlo simulation; Simulation of queuing systems. Building valid and credible simulation models: validation principles and techniques, statistical procedures for comparing real-world observations and simulated outputs, input modeling; Generating random numbers and random variates; Output analysis. Simulation languages: Analysis and modeling of some practical systems.

Suggested Books:
1. Modelling and Simulation, Giuseppe Petrone, Giuliano Cammarata – InTech
YEAR III: SEMESTER 2
(TOTAL CREDIT: 21.5)

IT 3201: Software Engineering
Software engineering principles, life cycle models, sizing, estimation, planning, and control, requirements specifications, functional specification and design, integration and testing strategies, quality assurance, configuration management, software maintenance.
Management of programming teams, programming methodologies, debugging aids, documentation and measurement of software verification and testing techniques and the problems of maintenance, modification and portability. Introduction to object-oriented software engineering.

Suggested Texts:
1. Carlo Ghezzi, Mehdi Jazayeri, Dino Mandrioli; Fundamentals of Software Engineering; 2nd edition; Pearson Education Asia
3. Mall R.; Fundamentals of Software Engineering; Prentice Hall of India
4. Behfarooz A. & Gydsib F.J.; Software Engineering fundamentals; Oxford University Press.
5. Jalote P.; An Integrated approach to Software Engineering; Narosa
6. Ian Sommervillie; Software Engineering, Pearson Education, Asia

IT 3202: Software Engineering Lab
Syllabus based on IT 3201

IT 3203: Computer Graphics

Suggested Books:

IT 3204: Computer Graphics Lab
Syllabus based on IT 3203

IT 3205: Web Technologies


IT 3206: Web Programming Lab
Syllabus based on IT 3205

IT 3207: Microprocessor and Interfacing
Introduction to microprocessors; Intel 8086 microprocessor: Architecture, addressing modes, instruction sets, assembly language programming, Memory Devices and Memory internal organization, Memory read and write timing diagrams, DRAM Controller; Basic I/O Interfacing: Parallel I/O, Programmed I/O, I/O port address decoding, The 8255A Programmable Peripheral Interface (PPI), programming 8255, Operation modes, Interface examples – Keyboard matrix, LCD/7-Segment Display, Printer, stepper motor, A/D and D/A converter; Timer Interfacing :The 8254 Programmable Interval Timer (PIT), Timing applications; Serial I/O Interface: Asynchronous communication, Physical communication standard-EIA RS232, Programmable Communication Interface - UART 8251, Interfacing serial I/O devices- mouse, modem, PC Keyboard; Interrupts :Interrupt driven I/O, Software & Hardware interrupts, Interrupt vectors and vector table, Interrupt processing, The 8259A Programmable Interrupt Controller (PIC)- cascadings of 8259a, programming 8259, DMA; The 8237 DMA Controller.

Suggested Books:

IT 3208: Microprocessor and Interfacing Lab
Laboratory Works based on IT 3207

IT 3209: Introduction to Bio-informatics
Introduction to bioinformatics, classification of biological databases, Biological data formats, application of bioinformatics in various fields. Introduction to single letter code of amino acids, symbols used in nucleotides, data retrieval – Entrez and SRS.


Syllabus for B.Sc. (Hons.) in Information Technology
What should and should not be programmed on the Web, Tasks suitable for programming on the Web, Choice of programming language for Web programming.

Client-side Programming: JavaScript for Web Programming: Introduction to the Language, JavaScript: Object Hierarchy and working with objects, JavaScript: Event-Driven Programming,


Suggested Books:
Bioinformatics databases: Introduction, Nucleotide sequence databases, Protein sequence databases.

Protein information resources: Biological data basics – primary secondary data basics – protein pattern data basics – DNA sequences data basics - DNA analysis - Genes structure and DNA sequences – interpretation of EST structures – different approach to EST analysis.


Suggested Books:

YEAR IV: SEMESTER 1
(TOTAL CREDIT: 19.5)

IT 4101: Artificial Intelligences & Neural Networks
Introduction: AI problems, foundation of AI and history of AI intelligent agents: Agents and Environments, the concept of rationality, the nature of environments, structure of agents, problem solving agents, problem formulation.


Knowledge Representation & Reasons logical Agents, Knowledge – Based Agents, the Wumpus world, logic, propositional logic, Resolution patterns in propositional logic, Resolution, Forward & Backward. Chaining.


Suggested Books:
2. Artificial Neural Networks B. YagnaNarayana, PHI
6.Neural Networks Simon Haykin PHI

IT 4102: Artificial Intelligences & Neural Networks Lab
Laboratory Works based on IT 4101

IT 4103: Telecommunication System Fundamentals

Telephone Systems and Cabling: From stand-alone to connect telephones; PBS; PBX, Centrex.
Switching and Signaling: Step-by-step telephone exchanges, Reed relay and crossbar exchanges, EMD exchange, Stored program control, Signaling, Digital exchanges.

Traffic Theory: The Erlang, Erlang’s lost call formula, Queuing systems.

Suggested Texts:
1. Fundamentals of Telecommunications-R. L. Freeman,
3. W. Fraser, “Telecommunications”
4. Sanjeeva Gupta, “Electronic Communications”.
6. Fundamentals Of Fibre Optics In Telecommunication And Sensor Systems- Bishnu P. Pal

IT 4104: Telecommunication System Fundamentals Lab
Laboratory Works based on IT 4105

IT 4105: Management Information System

Nature of information systems: nature & type, key characteristics; Nature of organization: nature & type, key characteristics; Two way relationship between is and organization: IS’s influence on organization, organization’s influence on IS; Introduction to e-business, e-business transformation: models, opportunities and challenges; Defining the organization’s need for IS: determining the information need, drawing up a IS plan, IS design alternative, in-house development vs. outsourcing, Enterprise system vs. Functional modules, system lifecycle vs. other methodologies, automation, process improvement, BPR vs. paradigm shift;

Cost, benefit, nature of IS investment: determining the cost and benefit of IS, determining the Risk factors, business value of IS investment;


Suggested Books:

IT 4107: Parallel & Distributed Systems

Introduction: Why use parallel and distributed systems? Why not use them?, Speedup and Amdahl’s Law, Hardware architectures: multiprocessors (shared memory), networks of workstations (distributed memory), clusters, Software architectures: threads and shared memory, processes and message passing, distributed shared memory (DSM), distributed shared data (DSD).

Parallel Algorithms: Concurrency and synchronization, Data and work partitioning, Common parallelization strategies, Granularity, Load balancing, Examples: parallel search, parallel sorting, etc.


Shared-Memory Programming: Threads, Pitreads, Locks and semaphores

Distributed-Memory Programming: Message Passing, MPI, PVM

Other Parallel Programming Systems: TreadMarks: Distributed shared memory, Aurora: Scoped behaviour and abstract data types, Enterprise: Process templates, Protocols for DSM systems, Impact of network protocols (TCP/IP, UDP/IP, bulk-data transfer, etc.), System area networks (SAN) (e.g., Myrinet).

Suggested Books:

IT 4109: Multimedia Systems & Applications

Introduction; Coding and compression standards; Architecture issues in multimedia; Operating systems issues in multimedia - real-time OS issues, synchronization, interrupt handling; Database issues in multimedia - indexing and storing multimedia data, disk placement, disk scheduling, searching for a multimedia document; Networking issues in multimedia - Quality-of-service guarantees, resource reservation, traffic specification, haping, and monitoring, admission control; Multicasting issues; Session directories; Protocols for controlling sessions; Security issues in multimedia, digital water-marking, partial encryption schemes for video streams; Multimedia applications - audio and video conferencing, video on demand, voice over IP.

Suggested Books:
YEAR IV: SEMESTER 8
(TOTAL CREDIT: 21.0)

IT 4201: Human Computer Interfacing
Introduction: The human; The computer; The interaction; Paradigms; Design basics: Interaction design basics; HCI in the software process; Design rules; Implementation support; Evaluation techniques; Universal design; User support; Models and Theories: Cognitive models; Socio-organizational issues and stakeholder requirements; Communication and collaboration models; Task analysis; Dialogue notations and design; Models of the system; Modelling; rich interaction; Groupware; Ubiquitous computing and augmented realities; Hypertext, multimedia, and the world wide web.

Suggested Books:

IT 4203: Wireless & Mobile Communication
Introduction: Concept, evolution and fundamentals of cellular telephony, mobile system architecture, design, performance and operation, antenna at cell site and mobile antenna. Radio wave propagation: Propagation characteristics, EIRP, models for radio propagation, Fresnel zone, reflection, diffraction, scattering, fading, modeling of multipath channel. Cellular radio system: Concept of cell and cell cluster, improving the capacity of a system, frequency reuse, cell splitting and sectoring, co-site, co-channel and adjacent channel interferences, Hand off and dropped calls, frequency allocation techniques, concept of BTS, BSC and MSC, roaming, planning of mobile cellular networks. Digital mobile communication standards: GSM, GPRS, EDGE, CDMA, 3G, Wi-Fi, WiMAX and 4G systems, mobile IP and VoIP, wireless sensor networks.

Suggested Books:
2. “Wireless and Mobile Network Architectures” by Yi-Bing Lin and Imrich Chlamtac

IT 4221 Embedded System Design
INTRODUCTION TO EMBEDDED SYSTEMS: Embedded Systems Overview; Design Challenge; Processor Technology; IC Technology; Design Technology; Trade-Offs. CUSTOM SINGLE PURPOSE PROCESSORS: Combinational Logic; Sequential Logic; Custom Single Purpose Processor Design; Rt-Level Custom Single Purpose Processor Design; Optimizing Custom Single Purpose Processors. GENERAL PURPOSE PROCESSORS: Basic Architecture; Operation; Programmer’s View; Development Environment; ASIPs; Selecting a Microprocessor; General Purpose Processor Design STANDARD SINGLE-PURPOSE PROCESSORS: Timers, counters And Watchdog Timer; UART; Pulse Width Modulators; LCD Controllers; Keypad Controllers; Stepper Motor Controllers; Analog to Digital Converters; Real Time Clock. MEMORY: Memory Write Ability and Storage Permanence; Universal design; User support; Models and Theories: Cognitive models; Socio-organizational issues and design; Models of the system; Modelling; rich interaction; Groupware; Ubiquitous computing and augmented realities; Hypertext, multimedia, and the world wide web.

Suggested Books:

IT 4223: Speech Processing and Speech Recognition
Introduction to Speech Signal: production, Perception and Characterization; Speech production models: Acoustic theory of speech production, discrete-time speech model, lossless model of the vocal tract; Signal Processing and Analysis; Speech perception, digital processing of speech signals; Short-term processing of speech, linear prediction analysis, spectral analysis; Speech coding: LPC, MRA, enhancement, human auditory system, Pattern Comparison Techniques: Distortion Measures, Time Alignment and Normalization; Recognition System Design and Implementation: Source Coding, Template Training, Performance Analysis; Continuous Speech Recognition: Sub-word Units, Statistical Modeling, Context Dependent Units; Task oriented Models. Quality assessment, speech synthesis; Speaker recognition and verification systems.

Suggested Books:
1. Fundamentals of Speech Recognition- Lawrence Rabinere, Biing-Hwang Jung
2. Speech Recognition and Processing- John F. Beydos
3. Statistical Methods for Speech Recognition- Frederick Jelinek
4. Computer Speech: Recognition, Compression- Manfred, Robert Schroeder

**IT 4225: Digital Image Processing and Pattern Recognition**


Image Compression : Huffman coding-truncated Huffman coding-B2, binary codes, arithmetic coding-bit plane coding-contrast area coding-Run length encoding-transform coding JPEG and MPEG coding schemes.


**Suggested Books:**

**IT 4227: Mobile application Developments**

Mobile (Cellular) Telephony, Categories of Mobile Apps, Mobile Application Development: software architecture, application models, use interfaces, data storage, networking, specialized instruments (accelerometers, GPS, etc.), specific devices, operating platforms, development environments. Selling a Mobile App

**Suggested Books:**
1. mConway and Hillegass, iOS Programming, Big Nerd Ranch
2. Deitel, Deitel, Kern and Morgano, iPhone for Programmers, Prentice Hall.
3. Guy Hart-Davis, How to Do Everything iPod, iPhone & iTunes.

**IT 4229: Neuroinformatics**

Introduction: overview of neuroinformatics challenges and opportunities. List of suitable final projects and presentation template.


**Syllabus for B.Sc. (Hons.) in Information Technology**

Homework assignment: spike propagation and synaptic integration in the reconstructed data set, Electrophysiology and biophysics

**Suggested Books:**
1. Neuroinformatics (Methods in Molecular Biology) by Chiquito J. Crasto and S.H. Koslow
2. Neuroinformatics by Ronald Cohn Jesse Russell

**IT 4231: Object Oriented Software Engineering**

Software Engineering: Software related problems, software engineering, concepts, development activities; Modeling: Concepts, Modeling with UML

**Project Organization & Communication:** Project Organization & communication concepts and their activities

Requirements: Requirements elicitation & its activities and managing requirements elicitation

Analysis: Analysis overview, concepts, activities and managing analysis

System Design: Design overview, concepts, and activities, addressing design goals and managing system design

Object Design: Object reuse, its activities & managing reuse, Interface specification concepts & its activities and Managing object design

Testing: Testing concepts, activities and managing testing

Software Configuration Management: Configuration Management overview, concepts, activities and managing configuration management

**Suggested Books:**
Detailed Syllabus for Option- II

**IT 4251: Digital Communication Systems**
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; Audio and video conferencing technique, Cable and satellite TV networks, HDTV transmission.

**Suggested Books:**
1. Digital Communications (3rd Ed) – John R Barry, Edward A Lee, David G Messer Schmitt
2. Digital Communications: Fundamentals and Applications- John Proakis
3. Schaum’s Outline of Introduction to Digital System- Schaum’s Series

**IT 4253: Digital Signal Processing**
Introduction to Digital Signal Processing (DSP); Introduction; Digital Signal Processing; Sampling and Analog-to-Digital Conversion; Discrete Time Signals; Ambiguity in Digital signals; Discrete Time Systems; Application areas for DSP; Key DSP operations: Convolution, Correlation, Digital Filtering, Discrete Transformation, Modulation.

**System Design:** Methodology & Implementation Methodology; Motivation.

The Z-Transform: Introduction to z-Transform; General Results of z-transform; Inverse z-Transform: Inspection Method, Partial Fraction Expansion, Power Series Expansion, Contour Integration; Comparison of inverse z-transform method; Properties of z-transform; Complex Convolution Theorem and Parseval’s Relation.

**Implementation of Discrete-Time Systems:** Introduction; Block Diagram and Signal Flow Graph Representation of Digital Networks; Matrix Representation of Digital Networks; Basic Structures of IIR Systems: Direct Form, Cascade forms, Parallel Form; Transposed Forms; Basic Structures of FIR Systems; Finite Precision Effects; Tellegen’s Theory for Digital Filters and Its Applications.

**Design of Digital Filters:** Introduction to Digital Filters; Types of Digital Filters: FIR and IIR; Choosing between IIR and FIR Filters: Digital Filter Design Steps; Design of FIR Filters: Design of FIR Filters by Windowing, Design of Optimum Equiripple Linear-Phase FIR Filters Design of IIR Filters: Classical Continuous-Time Low-Pass Filter Approximations, Conversion of Transfer Functions from Continuous to Discrete Time, Frequency Transformations of Low pass Filters.

**Suggested Books:**
5. Terrel T.J. & Shark L.K., Digital Signal Processing, Macmillan

**IT 4255: E-commerce & E-governance**

**Syllabus for B.Sc. (Hons.) in Information Technology**


**Suggested Books:**
2. E-Commerce by Smith R, Speaker M, & Thompson M (Prentice Hall, India)
3. Designing Systems for Internet Commerce by Tressí GW & Stewart LC
4. E-Governance: A Global Perspective on a New Paradigm by Toshio Obi (Editor), IOS Press.
5. e-Commerce: Formulation of Strategy by Robert T. Plant, Prentice Hall
6. E-Governance: Styles of Political Judgement in the Information Age Polity by Perri 6, Palgrave Macmillan

**IT 4257: Cryptography**

**Suggested Books:**
1. Dominic Welsh – Codes and Cryptography, Oxford University Press

**IT 4259: Computer Network Security**

Information Authentication: Signature Schemes, Message Authentication and Hash Functions, Key Distribution, Public Key Infrastructure.


Firewall: Some Characteristics of firewall, Common Types of Firewall, Implementation of Firewall.

**Suggested Books:**


**IT 4261:** Optical Fiber Communication


**Suggested Books:**