M.Sc. Computer Science
(2- Year)

Programme Code : SCIS21

Handbook
2019-2020
These Regulations are common to all the students admitted to the Two-Year Master’s Programmes in the Faculties of Arts, Science, Indian Languages, Education, Marine Sciences, and Fine Arts from the academic year 2019-2020 onwards.

1. Definitions and Nomenclature

1.1 University refers to Annamalai University.

1.2 Department means any of the academic departments and academic centres at the University.

1.3 Discipline refers to the specialization or branch of knowledge taught and researched in higher education. For example, Botany is a discipline in the Natural Sciences, while Economics is a discipline in Social Sciences.

1.4 Programme encompasses the combination of courses and/or requirements leading to a Degree. For example, M.A., M.Sc.

1.5 Course is an individual subject in a programme. Each course may consist of Lectures/Tutorials/Laboratory work/Seminar/Project work/Experiential learning/Report writing/viva-voce etc. Each course has a course title and is identified by a course code.

1.6 Curriculum encompasses the totality of student experiences that occur during the educational process.

1.7 Syllabus is an academic document that contains the complete information about an academic programme and defines responsibilities and outcomes. This includes course information, course objectives, policies, evaluation, grading, learning resources and course calendar.

1.8 Academic Year refers to the annual period of sessions of the University that comprises two consecutive semesters.

1.9 Semester is a half-year term that lasts for a minimum duration of 90 days. Each academic year is divided into two semesters.

1.10 Choice Based Credit System A mode of learning in higher education that enables a student to have the freedom to select his/her own choice of elective courses across various disciplines for completing the Degree programme.

1.11 Core Course is mandatory and an essential requirement to qualify for the Degree.

1.12 Elective Course is a course that a student can choose from a range of alternatives.

1.13 Value-added Courses are optional courses that complement the students’ knowledge and skills and enhance their employability.
1.14 **Credit** refers to the quantum of course work in terms of number of class hours in a semester required for a programme. The credit value reflects the content and duration of a particular course in the curriculum.

1.15 **Credit Hour** refers to the number of class hours per week required for a course in a semester. It is used to calculate the credit value of a particular course.

1.16 **Programme Outcomes (POs)** are statements that describe crucial and essential knowledge, skills and attitudes that students are expected to achieve and can reliably manifest at the end of a programme.

1.17 **Programme Specific Outcomes (PSOs)** are statements that list what the graduate of a specific programme should be able to do at the end of the programme.

1.18 **Learning Objectives** also known as **Course Objectives** are statements that define the expected goal of a course in terms of demonstrable skills or knowledge that will be acquired by a student as a result of instruction.

1.19 **Course Outcomes (COs)** are statements that describe what students should be able to achieve/demonstrate at the end of a course. They allow follow-up and measurement of learning objectives.

1.20 **Grade Point Average (GPA)** is the average of the grades acquired in various courses that a student has taken in a semester. The formula for computing GPA is given in section 11.3

1.21 **Cumulative Grade Point Average (CGPA)** is a measure of overall cumulative performance of a student over all the semesters. The CGPA is the ratio of total credit points secured by a student in various courses in all semesters and the sum of the total credits of all courses in all the semesters.

1.22 **Letter Grade** is an index of the performance of a student in a particular course. Grades are denoted by the letters S, A, B, C, D, E, RA, and W.

2. **Programme Offered and Eligibility Criteria**

2.1 The Department of Computer and Information Science offers a **Two Year M.Sc. Computer Science Programme**. A pass in B.Sc. Computer Science/B.Sc., Information Technology/B.Sc., Software Development/B.Sc., Software Engineering/B.C.A or an examination accepted by the syndicate as equivalent thereto are eligible for admission.

2.2 Reservation of seats for candidates belonging to ST/SCA/SC/MBC/DNC/BC/BC (Muslim) communities and Differently-abled will be made as per the rules and regulations of the Government of Tamil Nadu.

2.3 In the case of SC/ST and Differently-abled candidates, a pass is the minimum qualification for all the above Programmes.

3. **Programme Duration**

3.1 The Two Year Master’s Programmes consist of two academic years.

3.2 Each academic year is divided into two semesters, the first being from July to November and the second from December to April.

3.3 Each semester will have 90 working days (18 weeks).
4. **Programme Structure**

4.1 The Two Year Master’s Programme consists of Core Courses, Elective Courses (Departmental & Interdepartmental), and Project.

4.2 **Core courses**

4.2.1 These are a set of compulsory courses essential for each programme.

4.2.2 The core courses include both Theory (Core Theory) and Practical (Core Practical) courses.

4.3 **Elective courses**

4.3.1 **Departmental Electives (DEs)** are the Electives that students can choose from a range of Electives offered within the Department.

4.3.2 **Interdepartmental Electives (IDEs)** are Electives that students can choose from amongst the courses offered by other departments of the same faculty as well as by the departments of other faculties.

4.3.3 Students shall take a combination of both DEs and IDEs.

4.4 **Experiential Learning**

4.4.1 Experiential learning provides opportunities to students to connect principles of the discipline with real-life situations.

4.4.2 In-plant training/field trips/internships/industrial visits (as applicable) fall under this category.

4.4.3 Experiential learning is categorized as Core.

4.5 **Project**

4.5.1 Each student shall undertake a Project in the final semester. The Head of the Department shall assign a Research Supervisor to the student.

4.5.2 The Research Supervisor shall assign a topic for research and monitor the progress of the student periodically.

4.5.3 Students who wish to undertake project work in recognised institutions/industry shall obtain prior permission from the University. The Research Supervisor will be from the host institute, while the Co-Supervisor shall be a faculty in the parent department.

4.6 **Value added Courses (VACs)**

4.6.1 Students may also opt to take Value added Courses beyond the minimum credits required for award of the Degree. VACs are outside the normal credit paradigm.

4.6.2 These courses impart employable and life skills. VACs are listed in the University website and in the Handbook on Interdepartmental Electives and VACs.

4.6.3 Each VAC carries 2 credits with 30 hours of instruction, of which 60% (18 hours) shall be Theory and 40% (12 hours) Practical.

4.6.4 Classes for a VAC are conducted beyond the regular class hours and preferably in the II and III Semesters.

4.7 **Online Courses**

4.7.1 The Heads of Departments shall facilitate enrolment of students in Massive Open Online Courses (MOOCs) platform such as SWAYAM to
provide academic flexibility and enhance the academic career of students.

4.7.2 Students who successfully complete a course in the MOOCs platform shall be exempted from one elective course of the programme.

4.8 Credit Distribution

The credit distribution is organised as follows:

<table>
<thead>
<tr>
<th>Course Type</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Core Courses</td>
<td>65-75</td>
</tr>
<tr>
<td>Elective Courses</td>
<td>15</td>
</tr>
<tr>
<td>Project</td>
<td>6-8</td>
</tr>
<tr>
<td>Total (Minimum requirement for award of Degree)</td>
<td>90-95*</td>
</tr>
</tbody>
</table>

*Each Department shall fix the minimum required credits for award of the Degree within the prescribed range of 90-95 credits.

4.9 Credit Hours

Each course is assigned credits and credit hours on the following basis:
1 Credit is defined as
1 Lecture period of one hour per week over a semester
1 Tutorial period of one hour per week over a semester
1 Practical/Project period of two or three hours (depending on the discipline) per week over a semester.

5 Attendance

5.1 Each faculty handling a course shall be responsible for the maintenance of Attendance and Assessment Record for candidates who have registered for the course.

5.2 The Record shall contain details of the students’ attendance, marks obtained in the Continuous Internal Assessment (CIA) Tests, Assignments and Seminars. In addition the Record shall also contain the organisation of lesson plan of the Course Instructor.

5.3 The record shall be submitted to the Head of the Department once a month for monitoring the attendance and syllabus coverage.

5.4 At the end of the semester, the record shall be duly signed by the Course Instructor and the Head of the Department and placed in safe custody for any future verification.

5.5 The Course Instructor shall intimate to the Head of the Department at least seven calendar days before the last instruction day in the semester about the attendance particulars of all students.
5.6 Each student shall have a minimum of 75% attendance in all the courses of the particular semester failing which he or she will not be permitted to write the End-Semester Examination. The student has to redo the semester in the next year.

5.7 Relaxation of attendance requirement up to 10% may be granted for valid reasons such as illness, representing the University in extracurricular activities and participation in NCC/NSS/YRC/RRC.

6 Mentor-Mentee System

6.1 To help the students in planning their course of study and for general advice on the academic programme, the Head of the Department will attach certain number of students to a member of the faculty who shall function as a Mentor throughout their period of study.

6.2 The Mentors will guide their mentees with the curriculum, monitor their progress, and provide intellectual and emotional support.

6.3 The Mentors shall also help their mentees to choose appropriate electives and value-added courses, apply for scholarships, undertake projects, prepare for competitive examinations such as NET/SET, GATE etc., attend campus interviews and participate in extracurricular activities.

7 Examinations

7.1 The examination system of the University is designed to systematically test the student's progress in class, laboratory and field work through Continuous Internal Assessment (CIA) Tests and End-Semester Examination (ESE).

7.2 There will be two CIA Tests and one ESE in each semester.

7.3 The Question Papers will be framed to test different levels of learning based on Bloom’s taxonomy viz. Knowledge, Comprehension, Application, Analysis, Synthesis and Evaluation/Creativity.

7.4 Continuous Internal Assessment Tests

7.4.1 The CIA Tests shall be a combination of a variety of tools such as class tests, assignments, seminars, and viva-voce that would be suitable to the course. This requires an element of openness.

7.4.2 The students are to be informed in advance about the assessment procedures.

7.4.3 The pattern of question paper will be decided by the respective faculty.

7.4.4 CIA Test-I will cover the syllabus of the first two units while CIA Test-II will cover the last three units.

7.4.5 CIA Tests will be for two to three hours duration depending on the quantum of syllabus.

7.4.6 A student cannot repeat the CIA Test-I and CIA Test-II. However, if for any valid reason, the student is unable to attend the test, the prerogative of arranging a special test lies with the teacher in consultation with the Head of the Department.

7.5 End Semester Examinations (ESE)

7.5.1 The ESE for the first/third semester will be conducted in November and for the second/fourth semester in May.
7.5.2 A candidate who does not pass the examination in any course(s) of the first, second and third semesters will be permitted to reappear in such course(s) that will be held in April and November in the subsequent semester/year.

7.5.3 The ESE will be of three hours duration and will cover the entire syllabus of the course.

8 Evaluation

8.1 Marks Distribution
8.1.1. Each course, both Theory and Practical as well as Project/Internship/Field work/In-plant training shall be evaluated for a maximum of 100 marks.
8.1.2. For the theory courses, CIA Tests will carry 25% and the ESE 75% of the marks.
8.1.3. For the Practical courses, the CIA Tests will constitute 40% and the ESE 60% of the marks.

8.2 Assessment of CIA Tests
8.2.1 For the CIA Tests, the assessment will be done by the Course Instructor
8.2.2 For the Theory Courses, the break-up of marks shall be as follows:

<table>
<thead>
<tr>
<th>Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test-I &amp; Test-II</td>
</tr>
<tr>
<td>Seminar</td>
</tr>
<tr>
<td>Assignment</td>
</tr>
<tr>
<td>Total</td>
</tr>
</tbody>
</table>

8.2.3 For the Practical Courses (wherever applicable), the break-up of marks shall be as follows:

<table>
<thead>
<tr>
<th>Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test-I</td>
</tr>
<tr>
<td>Test-II</td>
</tr>
<tr>
<td>Viva-voce and Record</td>
</tr>
<tr>
<td>Total</td>
</tr>
</tbody>
</table>

8.3 Assessment of End-Semester Examinations
8.3.1 Evaluation for the ESE is done by both External and Internal examiners (Double Evaluation).
8.3.2 In case of a discrepancy of more than 10% between the two examiners in awarding marks, third evaluation will be resorted to.

8.4 Assessment of Project/Dissertation
8.4.1 The Project Report/Dissertation shall be submitted as per the guidelines laid down by the University.
8.4.2 The Project Work/Dissertation shall carry a maximum of 100 marks.
8.4.3 CIA for Project will consist of a Review of literature survey, experimentation/field work, attendance etc.

8.4.4 The Project Report evaluation and viva-voce will be conducted by a committee constituted by the Head of the Department.

8.4.5 The Project Evaluation Committee will comprise the Head of the Department, Project Supervisor, and a senior faculty.

8.4.6 The marks shall be distributed as follows:

<table>
<thead>
<tr>
<th>Continuous Internal Assessment (25 Marks)</th>
<th>End Semester Examination (75 Marks)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Review-I: 10</td>
<td>Review-II: 15</td>
</tr>
<tr>
<td>Project / Dissertation Evaluation</td>
<td>Viva-voce</td>
</tr>
<tr>
<td>10</td>
<td>15</td>
</tr>
<tr>
<td>50</td>
<td>25</td>
</tr>
</tbody>
</table>

8.5 Assessment of Value-added Courses
8.5.1 Assessment of VACs shall be internal.
8.5.2 Two CIA Tests shall be conducted during the semester by the Department(s) offering VAC.
8.5.3 A committee consisting of the Head of the Department, faculty handling the course and a senior faculty member shall monitor the evaluation process.
8.5.4 The grades obtained in VACs will not be included for calculating the GPA.

8.6 Passing Minimum
8.6.1 A minimum of 50% marks in each course is prescribed for a pass.
8.6.2 While a minimum of 40% marks in each course is essential for the End Semester Examinations, there is no passing minimum for CIA Tests.
8.6.3 A student is declared to have passed in each course if he/she secures not less than 40% marks in the End Semester Examination and not less than 50% marks in aggregate taking CIA and End Semester Examination marks together.
8.6.4 A candidate who has not secured a minimum of 50% of marks in a course (CIA + End Semester) shall reappear for the course in the next semester/year.

9. Conferment of the Master's Degree
A candidate who has secured a minimum of 50% marks in all courses prescribed in the programme and earned the minimum required credits shall be considered to have passed the Master's Programme.

10 Marks and Grading
10.1 The performance of students in each course is evaluated in terms Grade Point (GP).
10.2 The sum total performance in each semester is rated by Grade Point Average (GPA) while Cumulative Grade Point Average (CGPA) indicates the Average
Grade Point obtained for all the courses completed from the first semester to the current semester.

10.3 The GPA is calculated by the formula

\[ GPA = \frac{\sum_{i=1}^{n} C_i G_i}{\sum_{i=1}^{n} C_i} \]

where, \( C_i \) is the Credit earned for the Course \( i \) in any semester;
\( G_i \) is the Grade Point obtained by the student for the Course \( i \) and
\( n \) is the number of Courses passed in that semester.

CGPA is the Weighted Average Grade Point of all the Courses passed starting from the first semester to the current semester.

\[ CGPA = \frac{\sum_{i=1}^{m} \sum_{i=1}^{n} C_i G_i}{\sum_{i=1}^{m} \sum_{i=1}^{n} C_i} \]

where, \( C_i \) is the Credit earned for the Course \( i \) in any semester;
\( G_i \) is the Grade Point obtained by the student for the Course \( i \) and
\( n \) is the number of Courses passed in that semester.
\( m \) is the number of semesters

10.4 Evaluation of the performance of the student will be rated as shown in the Table.

<table>
<thead>
<tr>
<th>Letter Grade</th>
<th>Grade Points</th>
<th>Marks %</th>
</tr>
</thead>
<tbody>
<tr>
<td>S</td>
<td>10</td>
<td>90 and above</td>
</tr>
<tr>
<td>A</td>
<td>9</td>
<td>80-89</td>
</tr>
<tr>
<td>B</td>
<td>8</td>
<td>70-79</td>
</tr>
<tr>
<td>C</td>
<td>7</td>
<td>60-69</td>
</tr>
<tr>
<td>D</td>
<td>6</td>
<td>55-59</td>
</tr>
<tr>
<td>E</td>
<td>5</td>
<td>50-54</td>
</tr>
<tr>
<td>RA</td>
<td>0</td>
<td>Less than 50</td>
</tr>
<tr>
<td>W</td>
<td>0</td>
<td>Withdrawn from the examination</td>
</tr>
</tbody>
</table>

10.5 Classification of Results. The successful candidates are classified as follows:
10.5.1 For First Class with Distinction: Candidates who have passed all the courses prescribed in the Programme in the first attempt with a CGPA of 8.25 or above within the programme duration. Candidates who have withdrawn from the End Semester Examinations are still eligible for First Class with Distinction (See Section 12 for details).
10.5.2 For First Class: Candidates who have passed all the courses with a CGPA of 6.5 or above.
10.5.3 For Second Class: Candidates who have passed all the courses with a CGPA between 5.0 and less than 6.5.
10.5.4 Candidates who obtain highest marks in all examinations at the first appearance alone will be considered for University Rank.
10.6 Course-Wise Letter Grades
10.6.1 The percentage of marks obtained by a candidate in a course will be indicated in a letter grade.
10.6.2 A student is considered to have completed a course successfully and earned the credits if he/she secures an overall letter grade other than RA.
10.6.3 A course successfully completed cannot be repeated for the purpose of improving the Grade Point.
10.6.4 A letter grade RA indicates that the candidate shall reappear for that course. The RA Grade once awarded stays in the grade card of the student and is not deleted even when he/she completes the course successfully later. The grade acquired later by the student will be indicated in the grade sheet of the Odd/Even semester in which the candidate has appeared for clearance of the arrears.
10.6.5 If a student secures RA grade in the Project Work/Field Work/Practical Work/Dissertation, he/she shall improve it and resubmit if it involves only rewriting/ incorporating the clarifications suggested by the evaluators or he/she can re-register and carry out the same in the subsequent semesters for evaluation.

11. Provision for Withdrawal from the End Semester Examination
11.1 The letter grade W indicates that a candidate has withdrawn from the examination.
11.2 A candidate is permitted to withdraw from appearing for the ESE for valid reasons. However, such permission is granted only once during the entire duration of the programme.
11.3 The application for withdrawal shall be made ten days prior to the commencement of the examination and duly approved by the Controller of Examinations. Notwithstanding the mandatory prerequisite of ten days notice, due consideration will be given under extraordinary circumstances.
11.4 Withdrawal is not granted for arrear examinations of courses in previous semesters and for the final semester examinations.
11.5 Candidates who have been granted permission to withdraw from the examination shall reappear for the courses in the subsequent semester/year.
11.6 Withdrawal shall not be taken into account as an appearance for the examination when considering the eligibility of the candidate to qualify for First Class with Distinction.

12 Academic misconduct
Any action that results in an unfair academic advantage/interference with the functioning of the academic community constitutes academic misconduct. This includes but is not limited to cheating, plagiarism, altering academic documents, fabrication/falsification of data, submitting the work of another student, interfering with other students’ work, removing/defacing library or computer resources, stealing other students’ notes/assignments, and electronically interfering with other students'/University’s intellectual property. Since many of these acts may be committed unintentionally due to lack of awareness, students shall be sensitised on issues of academic integrity and ethics.

13. Transitory Regulations
Wherever there has been a change of syllabi, examinations based on the existing syllabus will be conducted for two consecutive years after implementation of the new syllabus in order to enable the students to clear the arrears. Beyond that, the students will have to take up their examinations in
equivalent subjects, as per the new syllabus, on the recommendation of the Head of the Department concerned.

14. Notwithstanding anything contained in the above pages as Rules and Regulations governing the Two Year Master’s Programmes at Annamalai University, the Syndicate is vested with the powers to revise them from time to time on the recommendations of the Academic Council.
Programme Structure
(For students admitted from the academic year 2019-2020)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Hours/Week</th>
<th>Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>L</td>
<td>P</td>
</tr>
<tr>
<td>Semester-I</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>19PCSC101</td>
<td>Core 1: Design and Analysis of Algorithms</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>19PCSC102</td>
<td>Core 2: Advanced Web Technology</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>19PCSC103</td>
<td>Core 3: Compiler Design</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>19PCSC104</td>
<td>Core 4: Advanced Java Programming</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>19PCSP105</td>
<td>Core 5: Practical – I</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>19PCSP106</td>
<td>Core 6: Practical - II</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Elective 1: Interdepartmental Elective</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Semester-II</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>19PCSC201</td>
<td>Core 7: Distributed Operating System</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>19PCSC202</td>
<td>Core 8: Dot Net Programming</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>19PCSC203</td>
<td>Core 9: Cryptography and Network Security</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>19PCSC204</td>
<td>Core 10: Advanced Database Management System</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>19PCSP205</td>
<td>Core 11: Practical - III</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>19PCSP206</td>
<td>Core 12: Practical - IV</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Elective 2: Interdepartmental Elective</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Semester-III</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>19PCSC301</td>
<td>Core 13: Digital Image Processing</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>19PCSC302</td>
<td>Core 14: Internet of Things</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>19PCSC303</td>
<td>Core 15: Machine Learning</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>19PCSP304</td>
<td>Core 16: Practical - V</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>19PCSP305</td>
<td>Core 17: Practical - VI</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Elective 3: Department Elective</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Elective 4: Department Elective</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Semester-IV</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>19PCSC401</td>
<td>Core 18: Software Project Management</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>19PCSP402</td>
<td>Dissertation and Viva Voce/In plant training</td>
<td>3</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>Elective 5: Department Elective</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Credits</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

L- Lectures; P- Practical; C- Credits; CIA- Continuous Internal Assessment; ESE- End-Semester Examination

Note:
1. Students shall take both Department Electives (DEs) and Interdepartmental Electives (IDEs) from a range of choices available.
2. Students may opt for any Value-added Courses listed in the University website.
# Department Elective Courses

<table>
<thead>
<tr>
<th>S. No</th>
<th>Course Code</th>
<th>Course Title</th>
<th>Department</th>
<th>hours/week</th>
<th>Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.</td>
<td>19PCSE306.1</td>
<td>Advanced Computer Networks</td>
<td></td>
<td>3 0 3 25</td>
<td>75 100</td>
</tr>
<tr>
<td>2.</td>
<td>19PCSE306.2</td>
<td>Web Services</td>
<td></td>
<td>3 0 3 25</td>
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# Inter Department Elective Courses

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**Value Added Course**

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**Programme Outcomes**

**PO1:** **Domain knowledge:** Demonstrate knowledge of basic concepts, principles and applications of the specific science discipline.

**PO2:** **Resource Utilisation:** Cultivate the skills to acquire and use appropriate learning resources including library, e-learning resources, ICT tools to enhance knowledge-base and stay abreast of recent developments.

**PO3:** **Analytical and Technical Skills:** Ability to handle/use appropriate tools/techniques/equipment with an understanding of the standard operating procedures, safety aspects/limitations.

**PO4:** **Critical thinking and Problem solving:** Identify and critically analyse pertinent problems in the relevant discipline using appropriate tools and techniques as well as...
approaches to arrive at viable conclusions/solutions.

PO5: **Project Management:** Demonstrate knowledge and scientific understanding to identify research problems, design experiments, use appropriate methodologies, analyse and interpret data and provide solutions. Exhibit organisational skills and the ability to manage time and resources.

PO6: **Individual and team work:** Exhibit the potential to effectively accomplish tasks independently and as a member or leader in diverse teams, and in multidisciplinary settings.

PO7: **Effective Communication:** Communicate effectively in spoken and written form as well as through electronic media with the scientific community as well as with society at large. Demonstrate the ability to write dissertations, reports, make effective presentations and documentation.

PO8: **Environment and Society:** Analyse the impact of scientific and technological advances on the environment and society and the need for sustainable development.

PO9: **Ethics:** Commitment to professional ethics and responsibilities.

PO10: **Life-long learning:** Ability to engage in life-long learning in the context of the rapid developments in the discipline.

**Programme Specific Outcomes**

At the end of the programme, the student will be able to

PSO1: Adapt the acquired knowledge for solving current and emerging issues in Computer Science and involved in life long learning.

PSO2: Gain and apply the knowledge of computer science concepts in appropriate domain of interest.

PSO3: Ability to analyze the problem, identify the required computing facility and implement it to obtain solutions.

PSO4: Identify and formulate algorithmic principles, mathematical knowledge and theory of Computer Science in modeling and design of computer-based systems. Understand and choose the appropriate modern techniques and tools for the complex systems of various domains and understands the advantages and limitations.

PSO5: Ability to communicate effectively in the basis of presenting their research work and gain knowledge on documentation and reports writing in a professional way.

PSO7: Students can independently enable to acquire the innovative ideas as per the modern era and they can create a value and wealth for the futuristic world.

PSO8: Develop and deploy software and/or hardware systems with assured quality and efficiency.
Learning Objectives (LO):
To learn effective problem solving in Computing applications and analyze the algorithmic procedure to determine the computational complexity of algorithms.


Unit 5 - Backtracking: The General Method – The 8-Queens Problem – Sum of Subsets – Graph Coloring – Hamiltonian Cycles – Knapsack Problem Branch and Bound: Least Cost searchhod - 0/1 Knapsack Problem.

Text Book

References
1. Data Structures Using C - Langsam, Augenstien, Tenenbaum, PHI  
2. Data structures and Algorithms, V.Aho, Hopcroft, Ullman , LPE  
3. Introduction to design and Analysis of Algorithms - S.E. Goodman, ST. Hedetniem- TMH.

Course Outcomes
At the end of the course, the student will be able to
CO1: Apply design principles and concepts to algorithm design.
CO2: Acquire the mathematical foundation in analysis of algorithms.
CO3: Understand the different algorithmic design strategies.
CO4: Analyze the efficiency of algorithms using various Problems.
CO5: Understand about Divide and Conquer and Greedy Method.

Outcome Mapping

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Learning Objectives (LO):

- Explore the backbone of web page creation by developing .NET skill.
- Enrich knowledge about HTML control and web control classes
- Provide depth knowledge about ADO.NET
- Understand the need of usability, evaluation methods for web services.

Unit - 1 – Overview of ASP.NET - The .NET framework – Learning the .NET languages: Data types – Declaring variables- Scope and Accessibility- Variable operations- Object Based manipulation- Conditional Structures- Loop Structures- Functions and Subroutines. Types, Objects and Namespaces : The Basics about Classes- Value types and Reference types- Advanced class programming- Understanding name spaces and assemblies. Setting Up ASP.NET and IIS.


Unit – 3 - Working with Data - Overview of ADO.NET - ADO.NET and data management- Characteristics of ADO.NET-ADO.NET object model. ADO.NET data access : SQL basics– Select , Update, Insert, Delete statements- Accessing data- Creating a connection- Using a command with a DataReader - Accessing Disconnected data - Selecting multiple tables – Updating Disconnected data. Data binding: Single value Data Binding- Repeated value data binding- Data binding with data bases. Data list – Data grid – Repeater – Files, Streams and Email – Using XML.

Unit – 4 - Web Services - Web services Architecture : Internet programming then and now- WSDL–SOAP- Communicating with a web service-Web service discovery and UDDI. Creating Web services : Web service basics- The StockQuote web service – Documenting the web service- Testing the web service- Web service Data types-ASP.NET intrinsic objects. Using web services: Consuming a web service- Using the proxy class- An example with TerraService.


Text Book

References

Course Outcomes
On successful completion of the course, the students will be able to,
CO1: Design a web page with Web form fundamentals and web control classes.
CO2: Recognize the importance of validation control, cookies and session.
CO3: Apply the knowledge of ASP.NET object, ADO.NET data access and SQL to develop a client server model.
CO4: Recognize the difference between Data list and Data grid controls in Accessing data.

Outcome Mapping

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Semester-I  19PCSC103: Compiler Design  Credits: 5  Hours : 4

Learning Objectives (LO):
- Discover principles, algorithms and techniques that can be used to construct various phases of compiler.
- Acquire knowledge about finite automata and regular expressions.
- Learn context free grammars, compiler parsing techniques.
- Explore knowledge about Syntax Directed definitions and translation scheme.
- Understand intermediate machine representations and actual code generation.


Unit – 2 - Syntax Analysis - The role of the parser - Context-free grammars - Writing a grammar - Top down Parsing - Bottom-up Parsing - LR parsers- LALR parsers.


Text Book

References

Course Outcomes
On successful completion of the course, the students will be able to,
CO1: Apply the knowledge of lexical tool & YACC tool to develop a scanner & parser.
CO2: Design & conduct experiments for Intermediate Code Generation in compiler.
CO3: Design & implement a software system for backend of the compiler.
CO4: Learn the new code optimization techniques to improve the performance of a program in terms of speed & space.

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Semester-I  19PCSC104: Advanced Java Programming Credits: 5
Hours : 4

Learning Objectives (LO):
- To deepen student’s programming skills by analyzing the real world problem
- in a programmer’s point of view and implement the concepts in real time projects
- To enable the students to learn the ethical, historical, environmental and technological aspects of Advanced Java Programming and how it impacts the social and economic development of society.

Unit-1 - Design Patterns: Introduction to Design patterns - Catalogue for Design Pattern - Factory Method Pattern, Prototype Pattern, Singleton Pattern- Adapter Pattern- Proxy Pattern-Decorator Pattern- Command Pattern- Template Pattern-Mediator Pattern-Collection Framework – Array List class – Linked List class – Array List vs. Linked List - List Iterator interface - Hash Set class- Linked Hash Set class-Tree Set class Priority Queue class - Map interface-Hash Map class- Linked Hash Map class –Tree Map class - Comparable interface -Comparator interface- Comparable vs. Comparator

Unit-2 - Applet Fundamentals- Applet Class - Applet lifecycle- Steps for Developing Applet Programs- Passing Values through Parameters- Graphics in Applets- GUI

**Unit-3 - JDBC -Introduction** - JDBC Architecture - JDBC Classes and Interfaces – Database Access with MySQL -Steps in Developing JDBC application - Creating a New Database and Table with JDBC - Working with Database Metadata; Java Networking Basics of Networking - Networking in Java- Socket Program using TCP/IP - Socket Program using UDP- URL and Inet address classes.

**Unit-4 - Servlet:** Advantages over Applets - Servlet Alternatives - Servlet Strengths - Servlet Architecture - Servlet Life Cycle – Generic Servlet, Http Servlet - First Servlet - Invoking Servlet - Passing Parameters to Servlets - Retrieving Parameters - Server-Side Include – Cookies- JSP Engines - Working with JSP - JSP and Servlet - Anatomy of a JSP Page- Database Connectivity using Servlets and JSP.

**Unit-5 - Lambda Expressions-** Method Reference- Functional Interface- Streams API, Filters- Optional Class- Nashorn- Base 64 Encode Decode- JShell(RPEL)- Collection Factory Methods- Private Interface Methods- Inner Class Diamond Operator-Multiresolution Image API.

**Textbooks**

**References**

**Course Outcomes**
On successful completion of the course, the students will be able to,

**CO1:** Learn the Internet Programming, using Java Applets and create a full set of UI Widgets using Abstract Windowing Toolkit (AWT) & Swings.

**CO2:** Learn to access database through Java programs, using Java Data Base Connectivity (JDBC).

**CO3:** Create dynamic web pages using Servlets and JSP.

**CO4:** Invoke the remote methods and multitier application using Remote Method Invocation (RMI) and EJB.

**Outcome Mapping**

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Learning Objectives (LO):
This course will enable students to,

- Design and implement various algorithms in JAVA
- Employ various design strategies for problem solving.
- Measure and compare the performance of different algorithms.

1. Create a Java class called **Student** with the following details as variables within it.
   - (i) USN
   - (ii) Name
   - (iii) Branch
   - (iv) Phone
   Write a Java program to create \( n \) **Student** objects and print the USN, Name, Branch, and Phone of these objects with suitable headings.

2. Write a Java program to implement the Stack using arrays. Write **Push()**, **Pop()**, and **Display()** methods to demonstrate its working.

3. Design a superclass called **Staff** with details as StaffId, Name, Phone, Salary. Extend this class by writing three subclasses namely **Teaching** (domain, publications), **Technical** (skills), and **Contract** (period). Write a Java program to read and display at least 3 **staff** objects of all three categories.

4. Write a Java class called **Customer** to store their name and date_of_birth. The date_of_birth format should be dd/mm/yyyy. Write methods to read customer data as <name, dd/mm/yyyy> and display as <name, dd, mm, yyyy> using StringTokenizer class considering the delimiter character as “/”.

5. Sort a given set of \( n \) integer elements using **Quick Sort** method and compute its time complexity. Run the program for varied values of \( n > 5000 \) and record the time taken to sort. Plot a graph of the time taken versus \( n \) on graph sheet. The elements can be read from a file or can be generated using the random number generator. Demonstrate using Java how the divide and-conquer method works along with its time complexity analysis: worst case, average case and best case.

6. Sort a given set of \( n \) integer elements using **Merge Sort** method and compute its time complexity. Run the program for varied values of \( n > 5000 \), and record the time taken to sort. Plot a graph of the time taken versus \( n \) on graph sheet. The elements can be read from a file or can be generated using the random number generator. Demonstrate using Java how the divide and-conquer method works along with its time complexity analysis: worst case, average case and best case.

7. Implement in Java, the **0/1 Knapsack** problem using (a) Dynamic Programming method (b) Greedy method.
8. Write a Java program to implement **Travelling Sales Person problem** using Dynamic programming.

9. Design and implement in Java to find all **Hamiltonian Cycles** in a connected undirected Graph G of n vertices using backtracking principle.

**Course Outcomes**

On successful completion of the course, the students will be able to,

CO1: Design algorithms using appropriate design techniques (greedy, dynamic programming, etc.).

CO2: Implement a variety of algorithms such as sorting, graph related, combinatorial, etc., in a high level language.

CO3: Analyze and compare the performance of algorithms using language features.

CO4: Apply and implement learned algorithm design techniques and data structures to solve real world problems.

**Outcome Mapping**

| CO/ PO | P01 | P02 | P03 | P04 | P05 | P06 | P07 | P08 | P09 | P010 | P03 | P04 | P05 | P06 | P07 | P08 | P09 | P10 | P11 | P12 | P13 | P14 | P15 | P16 | P17 | P18 | P19 | P20 | P21 | P22 | P23 | P24 |
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| C01    | ✓   | ✓   | ✓   |     | ✓   | ✓   | ✓   | ✓   | ✓   | ✓    | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   |
| C02    | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓    | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   |
| C03    | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓    | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   |
| C04    | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓    | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   |

**Semester-I 19PCSP106: Advanced Web Technology Lab**

**Credits**: 2

**Hours**: 2

**Learning Objectives (LO):**

- To understand the concept of web technologies.
- To creating web pages by using HTML Tags.
- To understand the importance of cascade style sheets in creating a web application.
- To understand the importance of Java Script in creating a web Application
- To understand the use of XML in Document type Definition.
- To know about PHP scripts and create adaptive web pages.

**List of Exercises**

- Write a HTML Program for using Image, Link and Formatting tags.
- Write a HTML Program to using table tag of your class Time table.
- Write a Forms in Html
- Write a HTML program to illustrate Frame tag..
- Write a HTML program to describe the cascade style sheet.
- Write a program to Document Type Definition in XML.
- Write a program For Validation using JavaScript.
- Write a Calculator program in Java script.
- Write a program for Multiplication table using Java script.
- Connection in My sql with php
- Insert record in mysql with php
- Create, Insert, Delete, Edit in mysql with php
Course Outcomes
On successful completion of the course, the students will be able to,
CO1: Develop to build a complete website using HTML.
CO2: Create web pages using DHTML and Cascading Style Sheets.
CO3: Able to include JavaScript for form validations and email validations.
CO4: Develop a simple web application using server side PHP programming and Database Connectivity using MySQL.
CO5: Able to create a complete Web Application with all the required modules.

Outcome Mapping

| CO/PO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 | PSO6 | PSO7 | PSO8 |
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| CO1   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓    | ✓    | ✓    | ✓    | ✓    | ✓    | ✓    | ✓    |
| CO2   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓    | ✓    | ✓    | ✓    | ✓    | ✓    | ✓    | ✓    |
| CO3   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓    | ✓    | ✓    | ✓    | ✓    | ✓    | ✓    | ✓    |
| CO4   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓    | ✓    | ✓    | ✓    | ✓    | ✓    | ✓    | ✓    |
| CO5   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓    | ✓    | ✓    | ✓    | ✓    | ✓    | ✓    | ✓    |

Learning Objectives (LO):
1. To study distributed operating system concepts
2. To understand hardware, software and communication in distributed OS
3. To learn the distributed resource management components.
4. Practices to learn concepts of OS and Program the principles of Operating Systems


**Text Books**

2. Distributed Operating System – Andrew S. Tanenbaum, PHI.

**Reference Books**


**Course Outcomes**

On successful completion of the course, the students will be able to,

CO1: Clear understanding on several resource management techniques like distributed shared memory and other resources.

CO2: Knowledge on mutual exclusion and Deadlock detection of Distributed operating system.

CO3: Able to design and implement algorithms of distributed shared memory and commit Protocols.

CO4: Able to design and implement fault tolerant distributed systems.

CO5: Understand the Mutual exclusion, Deadlock detection and agreement protocols of Distributed operating system.

**Outcome Mapping**

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**Learning Objectives (LO):**

- To explore the backbone of web page creation by developing .NET skill.
- To Familiar with Application, session and view state management
- To Provide depth knowledge about ADO.NET
- To Understand the need of usability, evaluation methods for web services
- To acquire knowledge on the usage of recent platforms in developing web applications

Unit – II - Developing VB.NET Applications - Introduction to VB.Net, The .Net Framework and Common language runtime, Building VB. Net Application, VB IDE, forms, properties, events, VB language-console application and 46 windows application, data type, declaring variable, scope of variable, operators and statements - Windows Applications-forms, adding controls to forms, handling events, MsgBox, Input Box, multiple forms, handling mouse and Keyboard events, object oriented programming-creating and using classes and objects, Handling Exceptions- on Error Goto.


Unit – IV - Developing C#.NET Applications - Introducing C# - overview of C# - Literals, Variables - Data Types, -Operators, -checked and unchecked operators – Expressions - Branching -Looping - Object Oriented Aspects Of C#: Class – Objects - Constructors and its types - inheritance, properties, indexers, index overloading – polymorphism - sealed class and methods - interface, - abstract class, operator overloading, - delegates, events, errors and exception - Threading.

Unit – V - ADO.NET - Overview of ADO.NET - ADO.NET data access – Connected and Disconnected Database, Create Connection using ADO.NET Object Model, Connection Class, Command Class Data binding – Data list – Data grid – Repeater – Files, Streams and Email – Using XML.

Text Books
2. Mathew Mac Donald, “ASP.NET Complete Reference”, TMH 2005
5. ASP.NET Unleashed, C# programming – Wrox publication
6. Visual Basic. NET Black Book, by Steven Holzner

Reference Books
2. Mario Szpuszta, Matthew MacDonald, “Pro ASP.NET 4 in C# 2010: Includes Silverlight
4. Visual Basic. Net programming in easy steps by Tim Anderson,

Course Outcomes
On successful completion of the course, the students will be able to,
CO1: Learn major programming paradigms and techniques involved in design and implementation of modern programming languages.
CO2: Learn about Microsoft .NET framework.
CO3: By the end students can develop, implement and creating Applications with C#. VB.NET and ASP.NET.
CO4: Creating ASP.Net applications using standard .net controls.
CO5: An ability to use current techniques, skills, and tools necessary for computing practice.
Learning Objectives (LO):

- To understand Cryptography Theories, Algorithms and Systems.
- To understand necessary Approaches and Techniques to build protection mechanisms in order to secure computer networks.
- To know about the malicious software & firewalls.


Text books
References

Course Outcomes
On successful completion of the course, the students will be able to,
CO1: Understand the fundamentals of networks security, security architecture, threats and vulnerabilities.
CO2: Apply the different cryptographic operations of symmetric cryptographic Algorithms.
CO3: Apply the different cryptographic operations of public key cryptography
CO4: Apply the various Authentication schemes to simulate different applications.
CO5: Understand various Security practices and System security standards

Outcome Mapping

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Semester-II 19PCSC204: Advanced Database Management System Credits: 5 Hours: 4

Learning Objectives (LO):
- To Acquire Knowledge of Database Models.
- To understand distributed database architecture.
- To learn the concepts of spatial database.
- To familiar with temporal database.


Unit-II - Distributed and Object based Databases: Architecture, Distributed data storage, Distributed transactions, Commit protocols, Concurrency control, Query Processing. Complex Data Types, Structured Types and Inheritance, Table Inheritance, array and Multiset, Object Identity and Reference Types, Object Oriented versus Object Relational.


**Unit-III - Spatial Database:** Spatial Database Characteristics, Spatial Data Model, Spatial Database Queries, Techniques of Spatial Database Query, Logic based Databases: Introduction, Overview, Propositional Calculus, Predicate Calculus, Deductive Database Systems, Recursive Query Processing.

**Unit-IV-XML Databases:** XML Hierarchical data model, XML Documents, DTD, XML Schema, XML Querying, XHTML, Illustrative Experiments.

**Unit-V- Temporal Databases:** Introduction, Intervals, Packing and Unpacking Relations, Generalizing the relational Operators, Database Design, Integrity Constraints, Multimedia Databases: Multimedia Sources, Multimedia Database Queries, Multimedia Database Applications.

**Text Book**

**Reference Books**

**Course Outcomes**
On successful completion of the course, the students will be able to,

- CO1: Know about the Various data models.
- CO2: Works on Database Architecture.
- CO3: Analyze data patterns.
- CO4: Handle object oriented databases

**Outcome Mapping**

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**Semester-II 19PCSP205: Dot Net Programming Lab**

**Credits:** 2

**Hours:** 2

**Learning Objectives (LO):**
1. To impart basic knowledge of different control statements and array associated with C# programming.
2. To learn various C# elements and OOPS concepts.
3. To learn interface, delegates, event and error handling concepts in C#.
4. To impart knowledge on networking including socket programming and reflection.
5. To acquire a working knowledge of windows and web based applications.

**List of Exercises**
1. Finding Prime number using Classes and Objects
2. Separating Odd/Even Number into Different Arrays
3. String Manipulations
4. Jagged Array manipulation
5. Implementing ‘ref’ and ‘out’ keywords
6. Implementing ‘Params ’ keyword
7. Boxing and Unboxing
8. Constructor Overloading
9. Implementing property
10. Implementing indexer
11. Implementing Multiple inheritance using Interface
12. Implementing Abstract Class
13. Exception Handling Using Try, Catch, and Finally
14. Demonstrating multicast Delegates
15. Implementing the Concept of Reflection
16. Socket Programming
17. Simple Calculator-A Window Application
18. Student Profile-A Window Application
19. Palindrome-A Web Application
20. Formatting Text-A Web Application

Course Outcomes

On successful completion of the course, the students will be able to,
CO1: Develop correct, well-documented C# programs using control statements.
CO2: Develop object oriented programming using C# classes and objects.
CO3: Handle the exception and event-driven programs.
CO4: Perform network based programming including chat applications.
CO5: Develop windows and web based applications.

Outcome Mapping

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Learning Objectives (LO):
- Keep abreast of current developments to continue their own professional development.
- To engage themselves in lifelong learning of Database management systems theories and technologies this enables them to purse higher studies.
- To interact professionally with colleagues or clients located abroad and the ability to overcome challenges that arises from geographic distance, cultural differences, and multiple languages in the context of computing.
- Develop team spirit, effective work habits, and professional attitude in written and oral forms, towards the development of database applications.

List of Exercises

Cycle – I (Simple SQL)
1. Employee Management System Using SQL Commands.
2. Students Management System Using SQL Commands.
4. Index Creation.
5. Implementation of SQL queries for route database.
6. Implementation of SQL queries for route database - part I.
7. Implementation of SQL queries for route database - Part II.
8. Creating view using SQL commands.
9. Creation of Table Partition.
10. Default trigger procedure and drop command

**Cycle – II (PL/SQL)**

12. Factorial of number
13. Checking whether a number is prime or not
14. Fibonacci series
15. Reversing the string
16. Swapping of two numbers
17. Odd or even number
18. Duplication of records

**Course Outcomes**

On successful completion of the course, the students will be able to,

**CO1:** In drawing the ER, EER, and UML Diagrams.

**CO2:** In analyzing the business requirements and producing a viable model for the implementation of the database.

**CO3:** In converting the entity-relationship diagrams into relational tables.

**CO4:** To develop appropriate Databases to a given problem that integrates ethical, social, legal, and economic concerns.

**Outcome Mapping**

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**Semester-III  19PCSC301:Digital Image Processing**

**Credits:** 5

**Hours:** 4

**Learning Objectives (LO):**

To provide complete knowledge on Digital Image Processing methods, such as image processing methods in Spatial domain and Frequency domain, Edge detection, Compression, Segmentation, and Morphological concepts, which enable the students to understand the concepts and implement them empirically.

**UNIT–I - Fundamentals:** Image Sensing and Acquisition, Image Sampling and Quantization, relationship between Pixels; Random noise; Gaussian Markov Random Field, σ-field, Linear and Non-linear Operations; Image processing models: Causal, Semi-causal, Non-causal models.


**UNIT–II- Spatial Domain:** Enhancement in spatial domain: Point processing; Mask processing; Smoothing Spatial Filters; Sharpening Spatial Filters; Combining Spatial Enhancement Methods.

**Frequency Domain:** Image transforms: FFT, DCT, Karhunen-Loeve transform, Hotlling’s T² transform, Wavelet transforms and their properties. Image filtering in frequency domain.
UNIT–III - Edge Detection: Types of edges; threshold; zero-crossing; Gradient operators: Roberts, Prewitt, and Sobel operators; residual analysis based technique; Canny edge detection. Edge features and their applications.

UNIT–IV Image Compression: Fundamentals, Image Compression Models, Elements of Information Theory. Error Free Compression: Huff-man coding; Arithmetic coding; Wavelet transform based coding; Lossy Compression: FFT; DCT; KLT; DPCM; MRPM based compression; Wavelet transform based; Image Compression standards.


Morphological Image Processing: Erosion and Dilation, Opening and Closing, Hit-Or-Miss Transformation, Basic Morphological Algorithms, Gray-Scale Morphology.

Text Books

References

Course Outcomes
On successful completion of the course, the students will be able to,

CO1: Review the fundamental concepts of a digital image processing system and Analyze images in the frequency domain using various transforms.

CO2: Evaluate the techniques for image enhancement and image restoration. Categorize various compression techniques.

CO3: Interpret Image compression standards, and Interpret image segmentation and representation techniques.

CO4: Gain idea to process various image used in various fields such as weather forecasting, Diagnosis of various diseases using image such as tumor, cancer etc.

Outcome Mapping

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Semester-III  19PCSC302 : Internet of Things          Credits: 5
                                                      Hours: 4

Learning Objectives (LO):
In order to gain knowledge on bases of Internet of Things (IoT), IoT Architecture,
and the Protocols related to IoT; and understand the concept of the Web of Thing
and the relationship between the IoT and WoT.

UNIT I – Introduction to IoT: Internet of Things - Physical Design- Logical Design- IoT
Enabling Technologies - IoT Levels and Deployment Templates - Domain Specific
IoTs - IoT and M2M - IoT System Management with NETCONF-YANG- IoT Platforms
Design Methodology.

UNIT II - IoT Architecture: M2M high-level ETSI architecture - IETF architecture for
IoT - OGC architecture - IoT reference model - Domain model - information model -
functional model - communication model - IoT reference architecture

802.15.4 – BACNet Protocol – Modbus– Zigbee Architecture – Network layer –
6LowPAN - CoAP - Security

UNIT IV - Web of Things: Web of Things versus Internet of Things – Two Pillars of the
Web – Architecture Standardization for WoT– Platform Middleware for WoT – Unified
Multitier WoT Architecture – WoT Portals and Business Intelligence. Cloud of
Things: Grid/SoA and Cloud Computing – Cloud Middleware – Cloud Standards –
Cloud Providers and Systems – Mobile Cloud Computing – The Cloud of Things
Architecture.

UNIT V - Applications: The Role of the Internet of Things for Increased Autonomy
and Agility in Collaborative Production Environments - Resource Management in
the Internet of Things: Clustering, Synchronisation and Software Agents.
Applications - Smart Grid – Electrical Vehicle Charging.

Text Books
1. Arshdeep Bahga, Vijay Madisetti, “Internet of Things – A hands-on approach”,
2. Dieter Uckelmann, Mark Harrison, Michahelles, Florian (Eds), “Architecting the
3. Jan Ho¨ller, Vlasios Tsiatsis , Catherine Mulligan, Stamatis , Karnouskos,
Stefan Avesand. David Boyle, “From Machine-to-Machine to the Internet of
4. Networks, Crowds, and Markets: Reasoning About a Highly Connected World
David Easley and Jon Kleinberg, Cambridge University Press - 2010.
5. Olivier Hersent, David Boswarthick, Omar Elloumi , “The Internet of Things –

Course Outcomes
On successful completion of the course, the students will be able to,

CO1: Gain the basic knowledge about IoT and they will be able to use IoT related
products in real life.

CO2: It helps to rely less on physical resources and started to do their work
smarter.

CO3: Understand the technology and standards relating to IoTs.

CO4: Understand the critical parts of the ICT ecosystem required to mainstream
IoTs.

CO5 Acquire skills on developing their own national and enterprise level technical
strategies.
Learning Objectives (LO):

- To Learn about Machine Intelligence and Machine Learning applications.
- To implement and apply machine learning algorithms to real-world applications.
- To identify and apply the appropriate machine learning technique to classification, pattern recognition, optimization and decision problems.
- To understand how to perform evaluation of learning algorithms and model selection.


Unit IV – Instant based Learning: K- Nearest Neighbour Learning – Locally weighted Regression – Radial Basis Functions – Case Based Learning.


Text Book

References
Course Outcomes
On successful completion of the course, the students will be able to,
CO1: Have a good understanding of the fundamental issues and challenges of machine learning: data, model selection, model complexity, etc.
CO2: Have an understanding of the strengths and weaknesses of many popular machine learning approaches.
CO3: Appreciate the underlying mathematical relationships within and across Machine Learning algorithms and the paradigms of supervised and unsupervised learning.
CO4: Be able to design and implement various machine learning algorithms in a range of real-world applications.

Outcome Mapping

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Learning Objectives (LO):
- To impart skills on the processing the digital images.
- To learn the transform of the image from spatial domain to frequency domain.
- To perform edge deduction techniques.
- To gain knowledge on compressing the images using suitable techniques.
- To study the segmentation methods.

List of Exercises
- To perform linear and non linear operations on images.
- To perform smoothing operations on an image in spatial domain.
- To perform sharpening operations on an image in spatial domain.
- To transform the image into DCT, FFT and wavelet.
- To implement canny edge deduction.
- To study the performance of gradient operators.
- To implement huff-man coding technique.
- To perform DCT compression method.
- To implement image segmentation based on color.
- To implement erosion and dilation.

Course Outcomes
On successful completion of the course, the students will be able to,
CO1: Read and display the image.
CO2: Transform the domain from spatial to frequency.
CO3: Apply suitable operators to detect the edge.
CO4: Perform compression and segmentation methods.
Learning Objectives (LO):

- To expose the students in emerging technologies in the areas of machine learning.
- To make use of data sets in implementing the machine learning algorithms.
- To implement the machine learning concepts and algorithms.
- To develop a basic understanding of the principles of machine learning.
- To derive practical solutions using predictive analytics.
- To understand which techniques are more appropriate for which problems.

List of Exercises

- Reading and writing into .csv files
- Implement the Find–S algorithm.
- Implement the Candidate-Elimination algorithm.
- Classify a sample using ID3 algorithm.
- Build an artificial neural network by implementing backpropagation algorithm.
- Construct the naïve Bayesian classifier for classification.
- Construct a naïve Bayesian classifier and evaluate the classifier with accuracy, precision, and recall metrics.
- Implement the k-Nearest Neighbour algorithm to classify the data set.
- Implement the non-parametric Locally Weighted Regression algorithm.

Course Outcomes

On successful completion of the course, the students will be able to,

CO1: Read and display the image.
CO2: Transform the domain from spatial to frequency.
CO3: Apply suitable operators to detect the edge.
CO4: Perform compression and segmentation methods.

Outcome Mapping
Learning Objectives (LO):

- This course will enable students to:
- Understand the framework of project management
- Learn to monitor and control the project
- Know the sound knowledge in Agile method
- Know the team, cost, quality and resource management
- Identify and control the risk in the projects

Unit I - Project Management Framework:
Introduction: Project - Project management - Relationship among Project, Program and Portfolio management - Project and operations management - Role of project manager - Project management body of knowledge - Enterprise Environmental factors. Project life cycle and Organization: Overview of project life cycle - Projects vs Operational Work - Stakeholders - Organizational influences on project management. The Standard for Project Management of a Project: Project management processes for a project: Common project management process interactions - Projects management process groups - Initiating process group - planning process group - Executing process group - Monitoring and controlling process group - Closing process group.


Unit III - The Project Management Knowledge Areas:
Project integration management: Develop project charter - Develop project management plan - Direct and manage project execution - Monitor and control project work - Perform integrated change control - Close project or phase. Project scope management: Collect requirements - Define Scope - Create WBS - Verify Scope - Control Scope. Project team management: Define activities - Sequence activities - Estimate activity resources - Estimate Activity Durations - Develop Schedule - Control Schedule.

Unit IV - Project Cost Management:

Unit V - Project Risk Management:

Text Books

Reference books

Course Outcomes
On successful completion of the course, the students will be able to,

CO1: Analyze the scope, cost, timing, and quality of the project, at all times focused on project success as defined by project stakeholders.

CO2: Align the project to the organization’s strategic plans and business justification throughout its lifecycle.

CO3: Identify project goals, constraints, deliverables, performance criteria, control needs, and resource requirements in consultation with stakeholders.

CO4: Implement project management knowledge, processes, lifecycle and the embodied concepts, tools and techniques in order to achieve project success.

CO5: Adapt projects in response to issues that arise internally and externally.

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Department Elective Courses

19PCSE306.1: Advanced Computer Networks Credits: 3 Hours: 3

Learning Objectives (LO):
- To study communication network protocols, different communication layer structure
- To learn security mechanism for data communication


Unit 4 - Network layer - design issues - Routing algorithms - Congestion control algorithms – Quality of Service – Network layer of Internet- IP protocol – IP Address – Internet Control Protocol.

Text Book

Reference Books
2) F. Halsall, 1995, Data Communications, Computer Networks and Open Systems, Addison Wessley.

Website, E-learning resources: http://peasonhighered.com/tanenbaum

Course Outcomes
On successful completion of the course, the students will be able to,

CO1: To master the terminology and concepts of the OSI reference model and the TCP-IP reference model.

CO2: To master the concepts of protocols, network interfaces, and design/performance issues in local area networks and wide area networks.

CO3: To be familiar with wireless networking concepts, and be familiar with contemporary issues in networking technologies.

CO4: To be familiar with network tools and network programming.

Outcome Mapping

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Learning Objectives(LO):
- To enable the student to be familiar with distributed services, XML and web services
- To study the use of web services in B2C and B2B applications

Unit – I - Overview of Distributed Computing. Introduction to web services – Industry standards, Technologies and concepts underlying web services – their support to web services. Applications that consume web services.


Unit – III - A brief outline of web services – conversation – static and interactive aspects of system interface and its implementation, work flow – orchestration and refinement, transactions, security issues – the common attacks – security attacks facilitated within web services quality of services – Architecting of systems to meet
users requirement with respect to latency, performance, reliability, QOS metrics, Mobile and wireless services – energy consumption, network bandwidth utilization, portals and services management.

**Unit – IV- Building real world enterprise applications using web services** – sample source codes to develop web services – steps necessary to build and deploy web services and client applications to meet customer’s requirement – Easier development, customization, maintenance, transactional requirements, seamless porting to multiple devices and platforms.

**Unit - V - Deployment of Web services and applications** onto Tomcat application server and axis SOAP server (both are free wares) – Web services platform as a set of enabling technologies for XML based distributed computing.

**Textbooks**

**References**

**Course Outcomes**
On successful completion of the course, the students will be able to,

**CO1**: Understand the design principles and application of SOAP and REST based web services.

**CO2**: Design collaborating web services according to a specification.

**CO3**: Implement an application that uses multiple web services in a realistic business scenario.

**CO4**: Use industry standard open source tools such as Apache Axis2, Tomcat, Derby and Eclipse to build, test, deploy and execute web services and web applications that consume them.

**Outcome Mapping**

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**19PCSE306.3: Object Oriented Systems Development**

**Credits:** 3

**Hours:** 3

**Learning Objectives (LO)**
- Introduce the concept of Object-oriented design and understand the fundamentals of OOSD life cycle.
- Familiar with evolution of object-oriented model, classes and it notations
- Practice UML in order to express the design of software projects.
- Specify, analyze and design the use case driven requirements for a particular system.
- Enrich knowledge about DBMS, designing classes and object oriented testing.


Text Book


References


Course Outcomes

On successful completion of the course, the students will be able to,

CO1: Show how the object-oriented approach differs from the traditional approach to systems analysis and design.

CO2: Analyze, design, document the requirements through use case driven approach.
CO3: Explain the importance of modeling and how the Unified Modeling Language (UML) represents an object-oriented system using a number of modeling views.

CO4: Recognize the difference between various object relationships: inheritance, association and aggregation.

CO5: Show the role and function of test cases, testing strategies and test plans in developing object-oriented software.

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Learning Objectives (LO):
- Understand the basic concepts of mobile
- Be familiar with GPRS Technology
- Be exposed to Ad-Hoc networks
- Gain knowledge about different mobile platforms and application development

Unit 1 - Basics of Mobile - Mobile device profiles - Middleware and gateways - Wireless Internet - Smart clients - Three-tier Architecture - Design considerations for mobile computing - Mobility and Location based services.

Unit 2 - Mobile Computing through Internet - Mobile-enabled Applications - Developing Mobile GUIs - VUIs and Mobile Applications - Characteristics and benefits - Multichannel and Multi modal user interfaces - Synchronization and replication of Mobile Data - SMS architecture - GPRS - Mobile Computing through Telephony.


Text Books

References

**Course Outcomes**
On successful completion of the course, the students will be able to,

**CO1:** Show how the object-oriented approach differs from the traditional approach to systems analysis and design.

**CO2:** Analyze, design, document the requirements through use case driven approach.

**CO3:** Explain the importance of modeling and how the Unified Modeling Language (UML) represents an object-oriented system using a number of modeling views.

**CO4:** Recognize the difference between various object relationships: inheritance, association and aggregation.

**CO5:** Show the role and function of test cases, testing strategies and test plans in developing object-oriented software.

**Outcome Mapping**

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**19PCSE307.1 : Wireless Networks**

**Credits:** 3  
**Hours:** 3

**Learning Objectives (LO):**
- To Study about Wireless Networks, Protocol Stack and Standards.


Text book

References

Course Outcomes
On successful completion of the course, the students will be able to,
CO1: Conversant With The Latest 3G/4G And WiMAX Networks And Its Architecture.
CO3: Implement Different Type Of Applications For Smart Phones And Mobile Devices With Latest Network Strategies.

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19PCSE307.2 : Theory of Computation

Credits: 3
Hours: 3

Learning Objectives (LO):
The learning objectives of this course are to introduce students to the mathematical foundations of computation including automata theory; the theory of formal languages and grammars; the notions of algorithm, decidability, complexity, and computability. To enhance/develop students’ ability to understand and conduct mathematical proofs for computation and algorithms.

Unit 1 - Introduction to formal proof – Additional forms of proof – Inductive proofs – Finite Automata (FA) – Deterministic Finite Automata (DFA) – Non-deterministic Finite Automata (NFA) – Finite Automata with Epsilon transitions.
Unit 2 - Regular Expression – FA and Regular Expressions – Proving languages not to be regular – Closure properties of regular languages – Equivalence and minimization of Automata.


Unit 4 - Normal forms for CFG – Pumping Lemma for CFL – Closure Properties of CFL – Turing Machines – Programming Techniques for TM. A language that is not Recursively Enumerable (RE).

Unit 5 - An undecidable problem RE – Undecidable problems about Turing Machine – Post’s Correspondence Problem – The classes P and NP.

Textbook

Reference Books

Course Outcomes
On successful completion of the course, the students will be able to,

CO1: Analyse and design finite automata, pushdown automata, Turing machines, formal languages, and grammars.

CO2: Demonstrate their understanding of key notions, such as algorithm, computability, decidability, and complexity through problem solving.

CO3: Prove the basic results of the Theory of Computation, state and explain the relevance of the Church-Turing thesis.

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19PCSE307.3:Optimization Techniques

Credits: 3
Hours: 3

Learning Objectives (LO):
- To understand the concept of optimization
- To develop mathematical model of real life cases
- To study Optimization algorithms
Unit – I - Linear Programming Problem (LPP): Formulations and graphical solution of (2 variables) canonical and standard terms of linear programming problem. Simplex method, Two phase simplex method

Unit – II - Duality in LPP- dual problem to primal- primal to dual problem-duality simplex method-Revised simplex method-revised simplex algorithm-revised simplex method versus simplex method


Unit – IV - Replacement Problem: Replacement policy for equipment that deteriorate gradually, Replacement of item that fail suddenly-Individual and group replacement, Problems in mortality and staffing.


Textbooks

References

Course Outcomes
On successful completion of the course, the students will be able to,

CO1: Describe clearly a problem, identify its parts and analyze the individual functions. Feasibility study for solving an optimization problem.

CO2: Evaluate and measure the performance of an algorithm, Discovery, study and solve optimization problems.

CO3: Understand optimization techniques using algorithms, and Investigate, study, develop, organize and promote innovative solutions for various applications.

Outcome Mapping

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19PCSE307.4 : Embedded Systems
Credits: 3
Hours: 3

Learning Objectives (LO):
This course will enable students to:
- Understand the basic hardware components and their selection method based on the characteristics and attributes of an embedded system.
- Describe the hardware software co-design and firmware design approaches
- Know the RTOS internals, multitasking, task scheduling, task communication and synchronization.
- Learn the development life cycle of embedded system

**Unit I - Introduction to Embedded system** - Embedded system vs General computing systems - History - Classification - Major Application Areas - Purpose of Embedded systems - Smart running shoes: The innovative bonding of lifestyle with embedded technology. Characteristics and Quality Attributes of Embedded systems

**Unit II - Elements of an Embedded system** - core of the embedded system: General purpose and domain specific processors, ASICs, PLDs, COTS - Memory - Sensors and Actuators - Communication Interface: Onboard and External Communication Interfaces - Embedded Firmware - Reset circuit, Brown-out protection circuit, Oscillator unit, Real-time clock, and Watchdog timer - PCB and Passive Components


**Unit IV - RTOS based Embedded System Design:** Operating System Basics - Types of operating Systems - Tasks, process and Threads - Multiprocessing and Multitasking - Task Scheduling- Task Communication - Task Synchronisation - Device Drivers - choosing an RTOS.

**Unit V - Components in embedded system development environment**, Files generated during compilation, simulators, emulators and debugging - Objectives of Embedded product Development Life Cycle - Different Phases of EDLC - EDLC Approaches - Trends in Embedded Industry - Case Study: Digital Clock.

**Text Book**

**Reference Books**

**Course Outcomes**
On successful completion of the course, the students will be able to,

**CO1**: Describe the differences between the general computing system and the embedded system, also recognize the classification of embedded systems.

**CO2**: Become aware of interrupts, hyper threading and software optimization.

**CO3**: Design real time embedded systems using the concepts of RTOS.

**Outcome Mapping**

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Learning Objectives (LO):
The purpose of the course is to impart knowledge on eXtensible Markup Language (XML) and to achieve secured, messaging through web services.


Text Books

References

Course Outcomes
On successful completion of the course, the students will be able to,

CO1: Apply XML concepts to develop Web application.
CO2: Develop SOA application using XML and Web Services.
CO3: Extract information from the web sites using XML programming.

Outcome Mapping

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Learning Objectives (LO):
- To understand the applications of various correlation methods
- To study and model the sampling concepts
- To acquire knowledge on Hypotheses test

Unit-I - Correlation - Definition of Correlation- Scatter Diagram- Kari Pearson’s Coefficient of Linear Correlation- Coefficient of Correlation and Probable Error of r- Coefficient of Determination - Merits and Limitations of Coefficient of Correlation- Spearman’s Rank Correlation (7.1-7.9.4).

Unit-II - Regression Analysis - Regression and Correlation (Intro)- Difference between Correlation and Regression Analysis- Linear Regression Equations - Least Square Method- Regression Lines- Properties of Regression Coefficients- Standard Error of Estimate (8.1-8.8)


Unit-IV - Sampling and Sampling Distributions - Data Collection- Sampling and Non-Sampling Errors – Principles of Sampling- Merits and Limitations of Sampling- Methods of Sampling- Parameter and Statistic- Sampling Distribution of a Statistic- Examples of Sampling Distributions- Standard Normal, Student’s t, Chi-Square (x²) and Snedecor’s F- Distributions (14.1-14.16).

Unit-V- Statistical Inference- Estimation and Testing of Hypothesis - Statistical Inference- Estimation- Point and interval- Confidence interval using normal, t and x² Distributions- Testing of Hypothesis- Significance of a mean - Using t Distribution (15.1-15.10.2).

Textbook

References

Course Outcomes
On successful completion of the course, the students will be able to,
CO1: Acquire the basic concepts in mathematical logic and theory of inferences.
CO2: Data analytics from a database formed from the real world problem.
CO3: Predict the exact reason for the real time issues.

Outcome Mapping

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Learning Objectives (LO):

- Develop the skills to gain a basic understanding of neural network theory and fuzzy logic theory.
- Introduce students to artificial neural networks and fuzzy theory from an engineering perspective.


Text Book

Reference Book

Course Outcomes
On successful completion of the course, the students will be able to,

CO1: Comprehend the fuzzy logic and the concept of fuzziness involved in various systems and fuzzy set theory.

CO2: Understand the concepts of fuzzy sets, knowledge representation using fuzzy rules, approximate reasoning, fuzzy inference systems, and fuzzy logic.

CO3: To understand the fundamental theory and concepts of neural networks, identify different neural network architectures, algorithms, applications and their limitations.

CO4: Understand appropriate learning rules for each of the architectures and learn several neural network paradigms and its applications.

CO5: Reveal different applications of these models to solve engineering and other problems.
Learning Objectives (LO):
To introduce the fundamental concepts of Data Mining Techniques and various Algorithms used for Information Retrieval from Datasets.

Unit I - Data Mining And Data Preprocessing: Data Mining – Motivation – Definition – Data Mining on Kind of Data – Functionalities – Classification – Data Mining Task Primitives – Major Issues in Data Mining – Data Preprocessing – Definition – Data Clearing – Integration and Transformation – Data Reduction.


Unit III - Frequent Patterns, Associations And Classification: The Apriori Algorithm – Definition of Classification and Prediction – Classification by Decision Tree Induction - Bayesian Classification – Rule Based Classification – Classification by Back Propagation – Lazy Learners – K-Nearest Neighbor – Other Classification Methods.


Unit V - Spatial, Multimedia, Text And Web Data: Spatial Data Mining – Multimedia Data Mining – Text Mining – Mining the World Wide Web – Data Mining Applications – Trends in Data Mining.

Text Books

References
Course Outcomes
On successful completion of the course, the students will be able to,
CO1: Basic data mining concepts for solving real world problems.
CO2: Understand the concepts of data mining.
CO3: Analyze the feasibility of data mining solution.
CO4: Apply basic statistical to evaluate the results of data mining models.
CO5: Develop data mining application to solve problems.

Outcome Mapping

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Learning Objectives (LO):
The objective of this course is to provide students with the comprehensive and in-depth knowledge of Cloud Computing concepts, technologies, architecture and applications by introducing and researching state-of-the-art in Cloud Computing fundamental issues, technologies, applications and implementations. Another objective is to expose the students to frontier areas of Cloud Computing and information systems, while providing sufficient foundations to enable further study and research.


**Text Books**

**References**

**Course Outcomes**
On successful completion of the course, the students will be able to,

- CO1: Apply different cloud programming model as per need.
- CO2: Introduce the broad perceptive of cloud architecture.
- CO3: Learn the economics of outsourcing IT to the Cloud.
- CO4: Explore some important cloud computing driven commercial systems such as Google Apps, Microsoft Azure and Amazon Web Services and other businesses cloud applications.
- CO5: Learn how DNS works, and how it can be used for service discovery using cloud.

**Outcome Mapping**

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**19PCSE403.5 : Data Science and Big Data Analytics**

**Credits:** 3  
**Hours:** 3

**Learning Objectives(LO):**
The course provides grounding in basic and advanced methods to big data technology and tools, including MapReduce and Hadoop and its ecosystem.


Testing – Difference of Means – Wilcoxon Rank-Sum Test – Type I and Type II Errors – Power and Sample Size – ANOVA.


**Text Book**

1. Data Science & Big Data Analytics: Discovering, Analyzing, Visualizing and Presenting Data”, EMC Education Services Published by John Wiley & Sons, Inc. 2015

**Reference Books**


**Course Outcomes**

On successful completion of the course, the students will be able to,

CO1: Apply Hadoop eco system components.

CO2: Participate data science and big data analytics projects.

CO3: Identify the characteristics of datasets for various applications.

CO4: Select environment for the applications.

CO5: Solve problems associated with big data characteristics.
Outcome Mapping

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Inter Department Elective Courses Offered to Other Departments

19CSE215.1 - Programming in R

Learning Objectives (LO):

- To provide an overview of a new language R used for data science and to introduce students to the R programming environment and related ecosystem and thus provide them with an in demand skill-set, in both the research and business environments.
- To introduce the extended R ecosystem of libraries and packages.
- To demonstrate usage of as standard Programming Language.
- To familiarize students with how various statistics like mean median etc. can be collected for data exploration in R and enable students to use R


Unit-II: Input, Output, Reading and Subsetting - Reading Data Files - Reading in Larger Datasets - Calculating Memory Requirements - File Connections - Reading Lines of a Text File - Reading From a URL Connection - Subsetting a Vector - Subsetting a Matrix - Subsetting Lists - Subsetting Nested Elements of a List - Extracting Multiple Elements of a List - Partial Matching.

Unit-III: Date, Time and Managing Data Frames - Dates in R - Times in R - Operations on Dates and Times - Data Frames - The dplyr Package - Installing the dplyr package – select – filter – arrange – rename – mutate - group_by - pipeline operator.


Unit-V: Simulation and Graphs - Generating Random Numbers - Setting the random number seed - Simulating a Linear Model - Loading and Processing the Raw Data – Creating a Graph - density plots - dot plots, bar charts - line charts - pie charts - box plots - Scatter plots.

Reference and Text Book

Course Outcomes

CO1. Install and use R for simple programming tasks.
CO2. Extend the functionality of R by using add-on packages and extract data from files and other sources and perform various data manipulation tasks on them.
CO3. Code statistical functions in R and use R Graphics and Tables to visualize results of various statistical operations on data.
CO4. Apply the knowledge of R gained to data Analytics for real life applications to conduct analytics on large real life datasets.

Value Added Courses

CISA215 - Web Development

Learning Objectives (LO):
- To learn about HTML, DHTML concepts.
- To implement a variety of presentation effects in HTML.
- To know about appropriate client-side applications.
- To gain the Knowledge of XML and its applications.
- To know about java scripts and create adaptive web pages.


UNIT – II - Tables: Introducing Tables, Grouping Section of a Table, Nested Tables, Accessing Tables. Forms: Introducing Forms, Form Controls, Sending Form Data to the Server. Frames: Introducing Frameset, <frame> Element, Creating Links Between Frames, Setting a Default Target Frame Using <base> Element, Nested Framesets, Inline or Floating Frames with <iframe>.


Text Books

1. Jon Duckett, Beginning HTML, XHTML, CSS and Java script , Wiley Publishing

Reference Books


**Course Outcomes**

On successful completion of the course, the students will be able to,

- CO1. Develop a dynamic webpage by the use of java script and DHTML.
- CO2. Create web pages using DHTML and Cascading Styles sheets.
- CO3. Build dynamic web pages using JavaScript (client side programming)
- CO4. Write a well formed / valid XML document.

**CISA415 – Advanced Web Development**

**Learning Objectives (LO):**

- Explore the backbone of web page creation by developing .NET skill.
- Enrich knowledge about HTML control and web control classes
- Provide depth knowledge about ADO.NET
- Understand the need of usability, evaluation methods for web services

**Unit – I - OVERVIEW OF ASP.NET** - The .NET framework – Learning the .NET languages : Data types – Declaring variables- Scope and Accessibility- Variable operations- Object Based manipulation- Conditional Structures- Loop Structures- Functions and Subroutines. Types, Objects and Namespaces : The Basics about Classes- Value types and Reference types- Advanced class programming- Understanding name spaces and assemblies. Setting Up ASP.NET and IIS.


**Unit – IV-Web Services** - Web services Architecture : Internet programming then and now- WSDL–SOAP- Communicating with a web service-Web service discovery and UDDI. Creating Web services : Web service basics- The StockQuote web service – Documenting the web service- Testing the web service- Web service Data types-ASP.NET intrinsic objects. Using web services: Consuming a web service- Using the proxy class- An example with TerraService.

Text Book

References

Course Outcomes
On the successful completion of this course, Students will be able to
CO1. Design a web page with Web form fundamentals and web control classes.
CO2. Recognize the importance of validation control, cookies and session.
CO3. Apply the knowledge of ASP.NET object, ADO.NET data access and SQL to develop a client server model.
CO4. Recognize the difference between Data list and Data grid controls in accessing data.