**PGCS-201: Software Project Management**

**Course outcomes:**
At the end of this course, a student shall be able to:
- explore similarities and differences between IT projects and other types of projects.
- apply general project management competencies to IT projects.
- built the techniques and develop the documents related to IT project management.
- understand how to apply different life-cycle models t design IT projects.
- analyze the nature of projects that plan plan-driven and agile development
- Identify IT project risks and develop risk mitigation strategies.

**Total Credits: 04**                                                    **Total lectures: 60**
**Course content**

**1.Introduction to competencies:**                                           **(12L)**
Product development technique - management skills - product development life cycle - software development process and models - The SEI CMM - international organization for standardization
**2. Domain process**                                                         **(12L)**
Managing domain process project selection models-project portfolio management – financial process selecting a project team – goal and scope of software project - project planning - creating the work breakdown structure – approaches to building a WBS – project milestones – work packages-building a WBS for software
**3. Software development:**                                                   **(12L)**
Tasks and activities – software size and reuse estimating- the SEI CMM – problems and task - cost estimation - effort measures - COCOMO:  A regret ion model – COCOMO II – SLIM: a mathematical model - organizational planning - project roles and skills needed.
**4. Scheduling activities:**                                                 **(12L)**
Project management recourse activities - organizational form and structure –software development dependences - brainstorming – scheduling fundamentals - PERT and CPM – leveling recourses assignment-ma the schedule to a real calendar – critical chain scheduling
**5. Quality assurance**                                                      **(12L)**
Quality requirements – the SEI CMM – guideline – challenges - quality function deployment – building the software quality assurance – plan –software configuration management: principals – requirements - planning and organizing – tools – benefits - legal issues in software - case study

**References Books:**
1. Robert T.Futrell, Donald F. Shafer, Linda I. Safer, "Quality Software Project Management", Pearson Education, Asia, 2002.
2. Pankaj Jalote,"Software Project, Manegment in Practice", Addison Wesley, 2002
3. Hughes," Software Project Management,3/E",Tata McGraw-Hill,2004

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## M.Sc. (Computer Science) (CBCS 2018 Course) Semester-II
## PGCS- 202: Cloud Computing

**Course outcomes:**
At the end of this course, a student shall be able to:
- explain the core issues of cloud computing such as security, privacy, and interoperability
- choose the appropriate technologies, algorithms, and approaches for the related issues
- analyze the functioning of different components involved in web services cloud platform
- identify problems and explain, analyze, and evaluate various cloud computing solutions

**Total Credits: 04**                                              **Total lectures: 60**
**Course content**
**1. Cloud Introduction:**                                                    **(12L)**
Cloud Computing Fundamentals: Cloud Computing definition, Types of cloud, Cloud services: Benefits and challenges of cloud computing, Evolution of Cloud Computing , usage scenarios and Applications , Business models around Cloud – Major Players in Cloud Computing - Issues in Cloud - Eucalyptus - Nimbus - Open Nebula, CloudSim.
**2. Cloud Services And File System**:                                         **(12L)**
Types of Cloud services: Software as a Service - Platform as a Service – Infrastructure as a Service - Database as a Service - Monitoring as a Service – Communication as services. Service providers- Google App Engine, Amazon EC2, Microsoft Azure, Sales force. Introduction to MapReduce, GFS, HDFS, Hadoop Framework.
**3. Collaborating With Cloud**:                                              **(12L)**
Collaborating on Calendars, Schedules and Task Management – Collaborating on Event Management, Contact Management, Project Management – Collaborating on Word Processing, Databases – Storing and Sharing Files- Collaborating via Web-Based Communication Tools – Evaluating Web Mail Services – Collaborating via Social Networks – Collaborating via Blogs and Wikis. 185 CS-Engg&Tech-SRM-2013
**4. Virtualization For Cloud** :                                             **(12L)**
Need for Virtualization – Pros and cons of Virtualization – Types of Virtualization – System Vm, Process VM, Virtual Machine monitor – Virtual machine properties - Interpretation and binary translation, HLL VM - Hypervisors – Xen, KVM , VMWare, Virtual Box, Hyper-V.
**5. Security, Standards, And Applications:**                                 **(12L)**
Security in Clouds: Cloud security challenges – Software as a Service Security, Common Standards: The Open Cloud Consortium – The Distributed management Task Force – Standards for application Developers – Standards for Messaging – Standards for Security, End user access to cloud computing, Mobile Internet devices and the cloud.
**Reference Books :**
1. Bloor R., Kanfman M., Halper F. Judith Hurwitz "Cloud Computing " Wiley India Edition,2010
2. John Rittinghouse & James Ransome, "Cloud Computing Implementation Management and Strategy", CRC Press, 2010
3. Antohy T Velte ,Cloud Computing : "A Practical Approach", McGraw Hill,2009
4. Michael Miller, Cloud Computing: "Web-Based Applications That Change the Way You Work and Collaborate Online", Que Publishing, August 2008.
5. James E Smith, Ravi Nair, "Virtual Machines", Morgan Kaufmann Publishers, 2006.

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## M.Sc. (Computer Science) (CBCS 2018 Course) Semester-II
## PGCS-203: Java Application Programming

**Course outcomes:**

At the end of this course, a student shall be able to:
- understand the structure and model of the Java programming language
- develop software in the Java programming language
- apply practical knowledge about servlets and JSP
- implement JDBC connectivity with servlets and JSP.
- apply  RMI and improve the knowledge about EJBs
- create web sites by using JSP

**Total Credits: 04**                                         **Total lectures: 60**

**Course content**

**Pre-requisite:** Students hould be familiar with basic programming concepts, basic objects oriented programming concept with java

**1.Networking    :                                          (8L)**

Networking basics, Connecting to the server, sockets for client and server one example writing client and server, UDP Datagram socket

**2.Java data Base    :                                      (10L)**

JDBC Introduction, Types and drivers, Querying databases, JDBC Metadata, Creating prepared statements, Scrollable result sets, Transaction management, connecting pooling,  save  points  and performing batch updates, distributed Transaction support

**3 .Java remote Method Invocation(RMI):                     (12L)**

introduction to distributed computing using RMI, RMI Architecture, Writing simple RMI application, Invoking remote object, Object serialization for remote parameters

**4.Servlet and JSP:                                         (10L)**

Introduction and life cycle, Servlet API, Servlet and Thread safety, HTTP Redirect, Managing User state: code, Session Tracking, servlet and JDBS, servletside Includes, JSP Introduction $ JSP Directive, JSP Scripting elements JSP Standard Action, JSP Implicit Object

**5.Enterprise Java Beans:                                   (8L)**

Introduction to EJB, Session beans, Entity beans(CMP/BMP)JNDI, One example development of enterprise, JavaBeans, Connecting EJB to web module,    Enterprise    application    Design consideration, Application deployment

**6.MVC Architecture and Struts Framework                    (12L)**

Introduction to MVC architecture, Development of controller Servlet, Development of   controller Servlet, Development of Model bean, Development of view components, Component integration and deployment, Introduction to struts, Struts application framework, struts controller model and view components, JSP Custom tag library, Struts and EJB.

**Reference Books:**

1. core java vol -II CAY R. Horstman and Gray cornel, Pearson Education
2. Java Server programming, wrox press
3. Inside Servlet, Dustin R. Callway, Pearson Education
4. Entrprise JavaBeans, Richard Monson Hafel, Oreilly Publication

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**Course Outcomes:**

At the end of this course, a student shall be able to:

- demonstrate a sound technical knowledge of their selected project topic.
- undertake problem identification, formulation and solution
- design engineering solutions to complex problems utilizing a systems approach.
- communicate with engineers and the community at large in written or oral forms.
- demonstrate the knowledge, skills and attitudes of a professional software developer.

**Total Credits: 04**

**Course content**

       The course Minor Project is one that involves requirement analysis, feasibility analysis, Database design, coding, testing, implementation and maintenance.

       Student will select individually Commercial or Technical project based on Technologies learnt in Semester I. Each student will have to prepare proper documentation consisting of SRS, Modeling Techniques, Development Strategies and Implementation and Testing Strategies. Student may use any Design Methodologies such as SSAD, OOAD and UML etc.

       This is a documentation project only. The project work will be presented by student using Power Point Presentation. The Institute may appoint external expert from industry or academics if it feels so. The students will be assessed internally by such panel for this project.

- The Project can be platform, Language and technology independent.
- Project will be evaluated by project guide.
- Assessment will be done weekly in the respective batch.
- Evaluation will be on the basis of weekly progress of project work, progress report, oral, results and documentation and demonstration.
- You should fill your status of the project work on the progress report and get the Signature of project guide regularly.
- Progress report should sharply focus how much time you have spent on specific task. (The format of progress report is given as follow.)
- You should keep all signed progress report.
- Project will not be accepted if progress report is not submitted and all responsibility remains with student.
- Students should prepare design document using SE/UML techniques depends on your project.

**About project Report**: -

The report should be typed on A4 size, executive bond paper for the final submission. The report should be in the good quality Rexene bound. We suggest, using one-and-half spaced printing, Times New Roman 12 font sizes for the normal text, 14-16 font sizes for headings & page titles. Number of copies: For one project you should prepare 2 copies of the project report. One for yourself, one for college (College copy can be in CD).

Evaluation for internal 40 marks

| Description | Marks |
| --- | --- |
| UML /ERD/DFD diagrams | 10 |
| Technology and design base first demo | 10 |
| Project technology based two assignments | 10 |
| Second Demo | 10 |

Evaluation for external 60 marks

| Description | Marks |
| --- | --- |
| Demo | 10 |
| Report | 10 |
| Presentation | 20 |
| Viva | 20 |

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**Course Outcomes:**
At the end of this course, a student shall be able to:
- understand concepts of network security and cryptographic techniques
- design and analyze cryptographic techniques
- solve network security issues in real time applications
- develop an understanding of security policies (such as authentication, integrity and confidentiality)
- understand and solve Electronic Mail Security issues
- use firewalls

**Total Credits: 04**                                                                          **Total lectures: 60**

**Course content**
**1. Introduction :**                                                                                            **(8L)**
OSI Reference Model, IP, UDP, and TCP, Replicated Directory Services ,Packet Switching, Network Components, Destination: Ultimate and Next Hop. Address Structure, Active Vs Passive Attacks, Viruses, Worms, Trojan, Horses, Multilevel Model of Security

**2.Introduction to Cryptography:**                                                                   **(12L)**
What is Cryptography, Breaking an Encryption scheme, Types of Cryptography, Functions, Secret Key Cryptography ,Public Key Cryptography, Hash Algorithms

**3.  Secrete Key Cryptography:**                                                                     **(12L)**
Generic block Encryption ,Data Encryption standard (DES),International Data Encryption Algorithm (IDEA),Advanced Encryption Standard (AES),  Modes of Operation, Encrypting Large Message, Generating MAC's, Multiple Encrypting DES, Hashes and Message Digests an Introduction

**4. Public Key Algorithm:**                                                                           **(10L)**
Modular  Arithmetic, RSA Algorithm, RSA Algorithm, Diffe-Signature standard (DSS),Number Theory, AES and Elliptic Curves

**5. Authentication System:**                                                                          **(10L)**
Password-Based Authentication, Address-based Authentication ,Cryptographic Authentication Protocols, Eavesdropping and Server Database Reading,   Trusted  Intermediaries,  Session  Key Establishment, Authentication of people, Security Handshake Pitfalls

**6. Electronic Mail Security:**                                                                        **(6L)**
Distribution List, Security Services for Electronic mail, Privacy Authentication of sources, Message Integrity, Proof of Submission and Delivery, Message Flow Confidentiality, PEM and S/MIME,PGP ( Preety and Good Privacy )

**7. Firewalls:**                                                                                              **(4L)**
Packet Filters, Application Level Gateway, Encryption Tunnels, Security System**,** NetWare V3,V5, DCE Security

**Reference Books:**
1. Charlie Kaufman, Radia Perlman, Mike Speciner, "NETWORK SECURITY-
2. Private Communication in a PUBLIC WORLD", 2<sup>nd</sup> Edition, Prentice Hall.
3. Edward Amoroso, "Fundamental of Computer Security Technology", Prentice    Hall.
4. William Stallings, "Cryptography and Network Security-Principle and Practice ", Prentice Hall.
5. Marsall D.Adams, Suil Jajodia and Harold J. Podell, Eds, "Information Security –an Integration Collection of Essays", IEEE Computer Society Press.
6. William R. Cheswick and Steven M. Bellowin, "Firewalls and Internet Security, Repelling the Wily Hacker", Addision-Wesley.
7. Gunter Schafer.Security in Fixed and Wireless networks.John Willy & Sons.
8. J.Schiller."Mobile Communications",Second edition,Addison-Wesley,2003
9. Charles P.Pfleeger,"Security in Computing",Prentice Hall.
10. Warwick Ford,"Computer Communication Security",Prentice Hall.
11. William Stalling,"Network Security Essentials",Prentice Hall.

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# M.Sc. (Computer Science) (CBCS 2018 Course) Semester-II
## Core Elective-II PGCS-205: Embedded Computing

**Course Outcomes:**
At the end of this course, a student shall be able to:
- Get the overview of embedded systems
- Understand the concepts and practices involved in the embedded computing domain.
- apply concepts of real time system and Emulation and Debugging techniques
- analyze and apply various applications of embedded system

**Total Credits: 04**                                                      **Total lectures: 60**

**Course content**
1. **An overview of embedded computing :**                                 **(6L)**
   Introduction to embedded systems, Categories of embedded systems, Requirements of embedded systems, Trends in embedded software Development Embedded Processors, Memories & Peripherals
   - Microcontrollers 8051
   - Discrete processors : 8-bit architecture, 16/32 bit CISC, RISC, DSP
   - Integrated processors : ARM RISC
   - Choosing a processor
   - Memory systems : types (SRAM, DRAM, FLASH), organization, access time, validating the contents of memory Basic peripherals : parallel ports, timers, clocks

2. **Applications of Embedded Systems:**                                    **(12L)**
   Consumer electronics, Control systems and industrial Automation, Biomedical systems, Field instrumentation, Handheld computers, Data communication, Network information appliances, Telecommunications, Wireless communications

3. **Real time system concepts**                                           **(12L)**
   - Critical section of code
   - Foreground/ background systems
   - Resource, shared resource
   - Multitasking, task, task switch
   - Kernel, scheduler, non-preemptive kernel, preemptive kernel
   - Reentrancy, round-robin scheduling
   - Task priority, static priority, dynamic priority, priority inversions, assigning task priorities
   - Mutual exclusion, deadlock, synchronization, event flags, intertask communication
   - Interrupts : latency, response, recovery, ISR processing time, NMI

4. **Writing software for embedded systems:**                              **(12L)**
   - The compilation process : compile, link, load Cross compilers
   - Run-time-libraries : processor dependent, I/O dependent, system calls, exit routines
   - Writing a library, using alternative libraries
   - Porting Kernels
   - C extensions for embedded systems

- Buffering and other data structures Linear buffers, Directional buffers, double buffer in, Buffer exchange, Linked lists, FIFO, Circular buffers, Buffer underrun and overrun, Allocating buffer memory, Buffer leakage

**5. Emulation and Debugging techniques** :                                    **(6L)**
- Debugging techniques: HLL simulation, low level simulation, on-board debugger, task level debugging, symbolic debug
- Emulation
- Optimization problems

**6. Basic design using RTOS** :                                               **(4L)**
- Principles
- Encapsulating semaphores and queues
- Hard real time scheduling considerations
- Saving memory space
- Saving power

**7. Real time without RTOS** :                                                **(8L)**
- Choosing the SW environment
- Deriving real time performance from non-real time system
- Scheduling and data sampling
- Controlling from an external switch
- Problems

**Reference Books:**
1. Dreamtech Software Team, 'Programming For Embedded Systems', Wiley-Dreamtech India Pvt.
2. Lewis D.W., 'Fundamentals of Embedded software: Where c and assembly Meet', Pearson Education Asia
3. Embedded Systems Design, 2e, Heath, Elsevier, ISBN:9788181479709
4. Embedded Systems Design with FPGAs, Saas, Elsevier, ISBN: 9789380501918
5. Programming Embedded Systems – Michael Barr
6. Embedded Systems Building Blocks _ Jean J. Labrosse
7. An Embedded Software Primer _ David E. Simon published by Pearson Educations

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## M.Sc. (Computer Science) (CBCS 2018 Course) Semester-II
## Core Elective-II   PGCS-206:  Data Mining

**Course outcomes:**
At the end of the course, a student shall be able to:
- understand various algorithms used for data mining
- analyze the data using existing data mining tools
- apply operations like association , classification  and clustering for a given dataset

**Total Credits: 04**                                               **Total lectures: 60**
**Course content**

**1. Data warehousing:**                                                                **(10L)**
Need for data warehousing , architecture of DW, benefits of DW,OLAP and data cubes, data preprocessing – need, data cleaning, data integration and transformation, data reduction, roll up ,drill down.
**2. Data marts:**                                                                          **(4L)**
Definition, reasons for creating data marts, designing data marts.
**3. Introduction to Data Mining:**                                                        **(12L)**
Definition, basic data mining tasks, knowledge discovery in databases, issues in the data mining, applications of data mining.
**4. Data mining techniques:**                                                             **(8L)**
Association rules, frequent item sets and association rule mining: apriori algorithm, FP growth algorithm.
**5. Classification:**                                                                     **(12L)**
Definition, need of classification, decision tree learning, Bayesian classification, Naive Bayes classifier, linear classifiers, linear regression, and non linear regression.
**6. Clustering:**                                                                         **(8L)**
Definition, need of clustering, types of clusters, similarities and distance measures, partitional algorithms like nearest neighbor algorithm- means.
**7. Applications of data mining:**                                                        **(6L)**
Social impacts of data mining, mining text database, mining spatial databases, mining web data.

**Reference Books:-**
1. Jiawei Han, micheline Kamber,"Data mining concepts and Techniques", Morgan Kaufmann publishers,2002.
2. Alex Berson,Stephen J.smith,"data warehousing, data mining and OLAP" Tata McGraw Hill 2004
3. M.H. Dunham "data mining" Pearson education.

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**M.Sc. (Computer Science) (CBCS 2018 Course) Semester-II**

**PGCS-207: Lab Course -IV**

**Course outcomes:**

At the end of the course, a student shall be able to:

- define & implement Virtualization using different types of Hypervisors
- apply steps to perform on demand Application delivery
- examine the installation and configuration of Open stack cloud
- analyze and understand the functioning of different components involved in web services cloud platform
- implement functioning of Platform as a Service
- design & Synthesize Storage as a service using Cloud

**Total Credits: 02**

**Course content**

**Software Lab based on Cloud Computing:**

1. Create virtual machines that access different programs on same platform.

2. Create virtual machines that access different programs on different platforms.

3. Exploring Google cloud for the following **:**
   a) Storage
   b) Sharing of data
   c) Manage your calendar, to-do lists,
   d) Document editing tool

4. Exploring Microsoft cloud

5. Exploring Amazon cloud

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**Course Outcomes:**
At the end of the course, a student shall be able to:
- implement core Java programs to solve simple problems .
- implement Client and Server end Java programs.
- develop software in the Java programming language
- develop GUI based java Windows application

**Total Credits: 02**
**Course content**

1. Write java program to create a user defined Exception class known as Pay Out Of Bounds Exception. Organization does not offer basic salary less than 8000. If entered salary is less than 8000 then program should create an Exception of Type Pay Out Of Bounds Exception. Program should calculate gross salary by considering salary parameters such as DA, HRA, CA, TA, Professional tax, TDS, PF. etc
2. Write a Java program to identify whether inputted data is byte/short/int/long/float/double/String/char type. (Use Exception Handling)
3. Write java program to draw the house on an applet.
4. Write java program to create a registration form using AWT.
5. Write java program to create an advertisement banner on an applet using multithreading.
6. Write a Java program to demonstrate the use of AWT components namely buttons,labels, text boxes, lists/combos, menus with event handling.
7. Write a java program to store personal telephone directory in such a way that when user hits a character, the names which starts with the character and telephone numbers should appear.
8. Write a program to create a window with four text fields for the name, street, city and pincode with suitable labels. Also windows contains a button MyInfo. When the user types the name, his street, city and pincode and then clicks the button, the types details must appear in Arial Font with Size 32, Italics.
9. Write a Java program to implement Swing components namely Buttons, ,JLabels, Checkboxes, Radio Buttons, JScrollPane, JList, JComboBox, Trees, Tables Scroll pane Menus and Toolbars to design interactive GUI.
10. Write java program implementing client/server socket programming.
11. Write java programs for :-
    - Manipulate files, directories and file system
    - Create data-centric applications using JDBC
    - Process strings using regular expressions

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**Course outcomes:**
At the end of the course, a student shall be able to:
- use basic concepts for building various applications in data mining field.
- understand design experiments using different data mining procedures.
- develop skills of analyzing test results of given experiments.

**Total Credits: 02**
**Course content**

Any 16 assignments on the following topics

1. Database generation and analysis using spreadsheets.
2. Data Preprocessing using WEKA: Applying filter –
      a. weka>filter>
      b. weka>filter>unsupervised>instance>
3. Explore the 'select attribute' as follows
      weka>attributeSelection>
3. Association mining
      weka>associations> , Apriori, FPGrowth
4. Classification Technique
      weka>classifiers> NaïveBayes , weka>classifiers>lazy> :  IBk
      weka>classifiers>trees , Random Tree , J48
5. Clustering Technique
      weka>clusters> , SimpleKMeans , FarthestFirst algorithm, hierarchicalCluster
6. Regression analysis Technique
7. Introduction to R model
8. Comparison of Data Mining Tools
9. Case study for comparing all classification, clustering techniques for measuring errors and
   performance.

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**PGAEC11: Soft Skills**

**Course Outcomes**

At the end of this course, a student shall be able to:
- communicate with others effectively
- exhibit qualities of leadership
- take responsibility to undertake a work and complete it.
- be aware of their own weaknesses
- work in groups either as members or leaders
- think critically or laterally and solve problems
- be flexible to the needs of others
- negotiate with others to solve problems (conflict resolution)
- cope with pressure and yet produce results

**Total Credits: 02**                                          **Total Lectures: 30**

**Course Contents**

1. Soft Skills: Meaning and definition; Employability skills, Life skills, Corporate skills.

2. Developing positive attitude: Ethics, Values, Manners & Etiquettes

3. SWOT analysis and Career Planning: Strengths, Weaknesses, Opportunities and Threats

4. Curriculum Vitae, Resume, Bio-Data: Types of personal and educational information, preparing CV according to the job requirements

5. Interview Techniques: Types of interviews, Personal appearance, basic research, Confidence, knowledge preparation, interview style

6. Time Management: Competency-building skills; identifying use of time, management of on-time task, identifying reasons for poor time management, and taking corrective action; overall time-planning; and learning where to go for information or guidance

7. Stress Management: coping with stress and anger; recognizing/understanding others' point of view; problem solving; peer negotiation and resistance; conflict management; active listening and effective communication; acceptance and/or tolerance of diversity groups; and telephone skills

8. Confidence building and Personal Integration:

9. Teamwork and Leadership: Group discussion, effective communication skills, Group behaviour, helping nature

10. Developing work culture: sincerity, negotiation techniques, summarizing information; summarizing information about specific points; organizing studies

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