GITAM INSTITUTE OF TECHNOLOGY AND MANAGEMENT (GITAM)

(Deemed to be University, Estd. u/s 3 of UGC Act 1956)

VISAKHAPATNAM *HYDERABAD *BENGALURU

Accredited by NAAC with 'A^{+}' Grade

REGULATIONS AND SYLLABUS

of

Bachelor of Computer Applications

(w.e.f 2021-22 Admitted batch)

Website: www.gitam.edu

B.C.A (Bachelor of Computer Applications)
REGULATIONS
(w.e.f. 2021-22 admitted batch)

The following guidelines are available at this url **https://www.gitam.edu/academic-regulations**

BCA CURRICULUM STRUCTURE
2021-22 ADMITTED BATCH

University Core (UC)

Course code	Level	Course title	L	T	P	J	S	C
CSEN1001	1	IT Productivity Tools^	0	0	2	0	0	1 *
LANG1001	1	Communication Skills in English - Beginners	0	0	4	0	0	2 *
LANG1011	1	Communication Skills in English	0	0	4	0	0	2
LANG1021	1	Advanced Communication Skills in English	0	0	4	0	0	2
CLAD1001	1	Emotional Intelligence & Reasoning Skills (Softskills 1)	0	0	2	0	0	1
CLAD1011	1	Leadership Skills & Quantitative Aptitude (Softskills 2)	0	0	2	0	0	1
CLAD1021	1	Verbal Ability & Quantitative Ability (Softskills 3)	0	0	2	0	0	1
CLAD1031	1	Practicing Verbal Ability & Quantitative Aptitude (Softskills 4)	0	0	2	0	0	1
VEDC1001	1	Venture Development	0	0	0	2	0	2
DOSP10XX	1	Sports 1#	0	0	0	2	0	2 *
DOSL10XX	1	Club Activity#	0	0	0	2	0	2 *
POLS1001	1	Indian Constitution and History	2	0	0	0	0	2 *
PHPY1001	1	Gandhi for the 21st Century	2	0	0	0	0	2 *
DOSL10XX	1	Community Service#	0	0	0	0	2	2 *
ENVS1001	1	Environmental Studies	3	0	0	0	0	3 *
MFST1001	1	Health and Welbeing#	0	0	2	0	0	1 *
CLAD20XX	2	Softskills 5A/5B/5C	0	0	2	0	0	1
CLAD20XX	2	Softskills 6A/6B/6C	0	0	2	0	0	1
								29

* Pass/Fail courses

Opt any three courses among the five

^ Online/Swayam/NPTEL Courses

Soft skills courses 5 and 6

Course code	Level	Course title	L	T	P	J	S	C
CLAD2001	2	Preparation for Campus Placement - 1 (Soft skills 5A)	0	0	2	0	0	1
CLAD2011	2	Preparation For Higher Education (GRE/ GMAT) - 1 (Soft skills 5B)	0	0	2	0	0	1
CLAD2021	2	Preparation for CAT/ MAT - 1 (Soft skills 5C)	0	0	2	0	0	1
CLAD2031	2	Preparation For Campus Placement - 2 (Soft skills 6A)	0	0	2	0	0	1
CLAD2041	2	Preparation For Higher Education (GRE/ GMAT) - 2 (Softskills 6B)	0	0	2	0	0	1
CLAD2051	2	Preparation for CAT/ MAT - 2 (Softskills 6C)	0	0	2	0	0	1

Sports courses

Course code	Level	Course title	L	T	P	J	S	C
DOSP1001	1	Badminton	0	0	0	2	0	2
DOSP1011	1	Chess	0	0	0	2	0	2
DOSP1021	1	Carrom	0	0	0	2	0	2
DOSP1031	1	Football	0	0	0	2	0	2
DOSP1041	1	Volleyball	0	0	0	2	0	2
DOSP1051	1	Kabaddi	0	0	0	2	0	2
DOSP1061	1	Kho Kho	0	0	0	2	0	2
DOSP1071	1	Table Tennis	0	0	0	2	0	2
DOSP1081	1	Handball	0	0	0	2	0	2
DOSP1091	1	Basketball	0	0	0	2	0	2
DOSP1101	1	Tennis	0	0	0	2	0	2
DOSP1111	1	Throwball	0	0	0	2	0	2

Club activity courses

Course code	Level	Course title	L	T	P	J	S	C
DOSL1001	1	Club Activity (participant)	0	0	0	2	0	2
DOSL1011	1	Club Activity (Member of club)	0	0	0	2	0	2
DOSL1021	1	Club Activity (Leader of CLub)	0	0	0	2	0	2
DOSL1031	1	Club Activity (Competitor)	0	0	0	2	0	2

Community service courses

Course code	Level	Course title	L	T	P	J	S	C
DOSL1041	1	Community Services - Volunteer	0	0	0	0	2	2
DOSL1051	1	Community Services - Mobilizer	0	0	0	0	2	2

Faculty Core (FC)

Course code	Level	Course title	L	T	P	J	S	C
MATH1131	1	Mathematics – I	4	0	0	0	0	4
MATH1141	1	Mathematics-II	4	0	0	0	0	4
	3	Elementary Statistics	4	0	0	0	0	4

Programme Core/ Major Core (PC/MaC)

Course code	Level	Course title	L	T	P	J	S	C
CSCI1041	1	Python Programming Lab	0	0	2	0	0	1
CSCI1051	1	Problem Solving and Programming with Python	4	0	0	0	0	4
CSCI1061	1	Introduction to Information technology	4	0	0	0	0	4
CSCI1071	1	Data Analysis Lab	0	0	2	0	0	1
CSCI1131	1	Fundamentals of Digital Logic Circuits	4	0	0	0	0	4
CSCI1081	1	Introduction to Operating Systems	4	0	0	0	0	4
CSCI1091	1	Web Technologies	4	0	0	0	0	4
CSCI1101	1	Web Technologies Lab	0	0	2	0	0	1
CSCI1111	1	Introduction to Object Oriented Programming with C++	4	0	0	0	0	4
CSCI1121	1	Programming with C++ Lab	0	0	2	0	0	1
CSCI2001	2	Elementary Data Structures Using C++	4	0	0	0	0	4
CSCI2011	2	Data Structures using C++ Lab	0	0	2	0	0	1
CSCI2021	2	Introduction to Unix Programming	4	0	0	0	0	4
CSCI2031	2	Unix Programming Lab	0	0	2	0	0	1
CSCI2041	2	Principles of Software Engineering	4	0	0	0	0	4
CSCI2051	2	Introduction to Data Communication and Networks	4	0	0	0	0	4
CSCI2061	2	Introduction to Database Management Systems	4	0	0	0	0	4
CSCI2071	2	Database Management Systems Lab	0	0	2	0	0	1
CSCI2081	2	Introduction to Java Programming	4	0	0	0	0	4

CSCI2091	2	Java Programming Lab	0	0	2	0	0	1
CSCI2121	2	Advanced Python Programming Lab	0	0	2	0	0	1
CSCI3001	3	Object Oriented Analysis and Design	4	0	0	0	0	4
CSCI3041	3	PHP Programming	4	0	0	0	0	4
CSCI3051	3	PHP Programming Lab	0	0	2	0	0	1
CSCI3061	3	Data Visualization using Tableau	0	0	2	0	0	1
CSCI3021	3	R Programming Lab	0	0	2	0	0	1
CSCI3071	3	Introduction to Cloud Computing	4	0	0	0	0	4
CSCI3081	3	Introduction to Block Chain Technologies	4	0	0	0	0	4
CSCI3091	3	Project work	0	0	12	0	0	12

Programme Elective (PE)#

Course code	Level	Course title	L	T	P	J	S	C
CSCI2101	2	Introduction to Cryptography	4	0	0	0	0	4
CSCI2111	2	Fundamentals of Artificial Intelligence	4	0	0	0	0	4
CSCI3011	3	Introduction to Data Mining	4	0	0	0	0	4
CSCI3031	3	Foundations of Data Science	4	0	0	0	0	4

Opt any one course in level 2 from Programme Elective basket
#opt any one course in level 3 from Programme Elective Basket

Open Elective (PE)#

Total credit distribution

Type of Course	Credits	% of Program (in credits)
University Core	29	21.17
Faculty Core	6	4.38
Major Core	102	74.45
Total	137	

PROGRAM EDUCATIONAL OBJECTIVIES

PEO1: Exhibit professional competencies and knowledge for being a successful technocrat.

PEO2: Adopt creative and innovative practices to solve real-life complex problems.

PEO3: Be a lifelong learner and contribute effectively to the betterment of the society.

PEO4: Be an effective and inspiring leader for fellow professionals and face the challenges of the rapidly changing multi-dimensional, contemporary world.

PROGRAM OBJECTIVES

PO1: Demonstrate the ability to adapt to technological changes and innovations in the discipline.

PO2: Analyse, design, implement and evaluate computerized solutions to real-life problems, using appropriate computing methods.

PO3: Facilitate overall understanding of the requirements of various computers, Mathematics, Communication skills subjects.

PO4: Acquire the knowledge, skills, experience, and values to become lifelong learners able to obtain employment in a computer-related field or go on to graduate study

PROGRAM OUTCOMES (POS)

1. **Engineering knowledge:** Apply the knowledge of mathematics, science, Engineering Fundamentals, and an Engineering specialization to the solution of complex engineering problems.
2. **Problem analysis:** Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3. **Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4. **Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5. **Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
6. **The Engineer and Society:** Apply reasoning informed by the contextual knowledge to as assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7. **Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8. **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9. **Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10. **Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11. **Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12. **Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAM SPECIFIC OUTCOMES (PSOs)

PSO1: Software Development Skills: Familiarity and practical competence with a broad range of programming languages. Apply standard software engineering practices and strategies in software project development.

PSO2: Mathematical Skills: An ability to apply mathematical methodologies to solve computation task, model real world problem using appropriate data structure and suitable algorithm.

PSO3: Knowledge of Computing Systems: Equip the graduates to potentially rich and employable in the field of Computer applications along with aspirations for higher studies.

PSO4: Life Long Learning: Prepare graduates who will be lifelong learners through continuous Professional development.

CSEN1001:ITProductivityTools

L	T	P	S	J	C
0	0	2	0	0	1*

Thiscourseintroducesallsoftwaretoolsthatimprovetheproductivityofastudentinenhancinghislearningexperience withallthe activitiestakenupaspartofhiscoursework.

Course Objectives

- to enable the learner, the skill in preparing technical documents of professional quality using docs, sheets and forms.
- toinvolvethestudentindesigning and creatingofwebsites andacquaintthestudent with theskillofprocessingaudio,images,documents etc.
- to create awareness in analysingdata using pivot tables, query manager etc.
- to create awareness in composing emails, mail merge, e-mail merge etc.
- to provide the exposure to work with collaborative tools.

ListofExperiments

1. Createatypicaldocumentconsistingoftext,tables,pictures, multiplecolumns, withdifferentpageorientations.
2. Create atechnicalpaper/technicalreportconsistingoftable ofcontents,table offigures,table oftables,bibilography,index,etc.
3. Composeandsendcustomizedmail/e-mailusingmail-merge.
4. Create/modifyapower pointpresentationwithtext,multimediausingtemplateswithanimation.
5. Createspreadsheetwithbasiccalculationswithrelativereference,absolutereferenceandmixedreferencemethods.
6. Simplereportpreparationusingfilteringtool/advancedfilteringcommands/pivottablesinspreadsheetapplication.
7. Analysetheresultsofaexaminationstudentwise, teacherwise, coursewise,institute-wise.
8. Collecting and consolidating data using collaborative tools like google docs, sheets,forms.
9. Createcharts/picturesusingonlinetoolslike:www.draw.ioor smartdraw
10. Createawebsiteofhisinterest.

TextBooks:

1. KatherinMurray,'Microsoft Office365Connect andcollaboratevirtuallyanywhere,anytime',MicrosoftPress,ISBN:978-0-7356-5694-9
2. EXCEL 2021 The Comprehensive Beginners to Advanced Users Guide to MasterMicrosoftExcel2021.LearntheEssentialFunctions,NewFeatures,Formulas,TipsandTricks,andManyMore
3. https://drawio-app.com/tutorials/video-tutorials/
4. Learning WebDesign:ABeginner'sGuidetoHTML,CSS,JavaScript,andWebGraphicsFourthEditionISBN-13:978-1449319274

References/OnlineResources

1. https://www.coursera.org/learn/introduction-to-computers-and-office-productivity- software
2. https://www.coursera.org/projects/analyze-data-pivot-tables-crosstabs-google-sheets
3. https://www.coursera.org/learn/excel-advanced#syllabus
4. https://www.coursera.org/learn/how-to-create-a-website

5. https://support.microsoft.com/en-us/office
6. https://www.diagrams.net/
7. https://edu.google.com/

CourseOutcomes

- Create/alterdocuments/TechnicalPaper /Projectreportwithtext,pictures, graphsofdifferentstyles.
- Create/modifypower pointpresentationswithtext,multimediaandtoaddanimationusing/creatingtemplates.
- Performbasiccalculations/retrievedata/createpivottables/chartusingaspreadsheetapplication.
- Createsimplediagrams/chartsusingonlinetools like:www.draw.io.
- Managedocuments,presentations,spreadsheetsandwebsitesincollaborativemode.

LANG1001:CommunicationSkillsinEnglish- Beginners

L	T	P	S	J	C
0	0	4	0	0	2*

CommunicationSkillsinEnglish(Beginner)isthefirstofthethree-levelcoursesforadevelopmental enhancement of learners' communication skills in English. This course focuses ongiving learnersexposureto factuallevelofcomprehension(listeningandreading)andapplicationof the learning (Speaking/Writing) with an awareness for social and personality-based variationsincommunication.InadditiontotheLSRWskills, thefocusofthecourseisonschematicthinkingskills. This course is activity-based and practice-oriented in terms of procedural knowledge ofvocabulary and grammatical structure. This syllabus is carefully developed to enable learners toengage in communication in English avoiding errors and be prepared for next level of learningEnglish.

Course Objectives

- Train learners to listen actively, follow what is spoken in standard English, and answerquestions to demonstrate their understanding of the main points of the speech, repeat part ofwhat someone has said to confirm mutual understanding, though occasionally, there may be aneed toaskforrepetitionorclarification.(Bloom'sTaxonomyLevel/s: 2&3)

- Equiplearners with the skills to read and comprehend straightforward texts and simpleargumentative writing to identify the topic, the desired/relevant information, the main pointsofthe argument,andthemajorconclusion/s.(Bloom'sTaxonomyLevel/s: 2&4)

- Help learners apply their knowledge and language skills to make mini oral presentations, andproduce short coherent written texts using appropriate cohesive devices, suitable vocabularyandgrammaticalstructures.(Bloom'sTaxonomyLevel/s:3)

- Enable learners to communicate with reasonable accuracy in familiar contexts with adequatefluency and generally good control by equipping them with a repertoire of frequently usedvocabulary,structures,andspeechpatterns.(Bloom'sTaxonomyLevel/s:2&3)

ListofActivities& TasksforAssessment

1. Listeningtoothersandgettingtoknowtheirexperiences,interestsandopinions
2. Introducingoneself:Salutation,basicinformation,relatingtothecontext
3. Startingaconversation:Salutation,expressingpurpose,expressinggratitude
4. Sharingone'sexperiences,interestsandopinions
5. Readingshortnewspaperarticlesforgist
6. Picking new wordsfromanarticle and workingonthemto knowthe meaning andusage
7. Usingthenew(unknown)wordsinownsentences
8. Sharingnewswithothers -initiate,sustainandconclude
9. Understandingtherelevanceofintonationtomeaningfrom recordedconversations,andapplyingthelearninginpairwork(roleplay)
10. Writingasummaryofastory/personalnarrativeafterlisteningtoittwiceandmakingindividualnotes
11. Readinggraphs,chartsandmapsforspecificinformation,makingnoteoftheimportantinformationandtalkingbrieflyaboutitwithina smallpeergroup
12. Writingaparagraphaboutoneself:abriefprofileincludingmajorsuccesses,failures,andgoals.G

ivingcompliments/gratitudetoothers

13. Writingaparagraph(descriptive,complimentary)aboutothers(Family,friends,rolemodel,etc.)
14. Correctingeachother's'drafts:errorsinlanguage-wordchoice,structure,andconventions/etiquette
15. Writingashortstructureddescriptive/narrativeessayin3paragraphs,readingothers'essaysandsharingfeedback

References

1. V.Sasikumar,P.KiranmayiDutt,GeethaRajeevan.(2007).ListeningandSpeaking-Foundation Books Cunninhum, S. & Moor, P. (nd). New Cutting Hedge (Intermediate).Longman
2. Cambrdige Academic English: An Integrated Skills Course for EAP (Intermediate) By CraigThaine,CUP(2012)
3. Rutherford, Andrea J. (2007). Basic Communication Skills for Technology: Second Edition.Delhi:PearsonEducation.
4. McCarthy, M., O'Dell, F., Mark, G. (2005). EnglishVocabularyinUse. Spain: CambridgeUniversityPress.
5. New Headway Academic Skills: Reading, Writing, and Study Skills Student's Book, Level-1bySarahPhilpot.OUP
6. Philpot, S.& Curnick, L. (2017). Headway: Academic Skills: Reaing, Writing, and StudySkills.IntroductoryLevel.OUP.
7. Thaine,C.(2012).CambridgeAcademicEnglish:AnIntegratedSkillsforEAP.Intermediate.CUP.

Online References

- www.teachingenglish.org.uk
- learnenglishteens.britishcouncil.org
- https://eslflow.com/
- https://www.englishclub.com/
- https://www.oxfordlearnersdictionaries.com/
- https://dictionary.cambridge.org/
- learnenglishteens.britishcouncil.org
- https://freerice.com/categories/english-vocabulary

Course Outcomes

- Listenactively,understandandextracttheessentialinformationfromshorttalks/conversations/discussions that are delivered in clear, standard speech. (Bloom's TaxonomyLevel/s:2 &3)
- Read,understand,andextractspecificinformationfromstraightforwardfactualandsimpleargumentativetextsongeneraltopicsandsubjectsofinterest.(Bloom'sTaxonomyLevel/s:2&3)
- Speakclearlywithsomeconfidenceonmattersrelatedtohis/herinterestsandacademicwork,andmake short structuredoral presentationson topicsof personal interest. (Bloom'sTaxonomyLevel/s:3)
- Writeshortstraightforwardconnectedtextsonarangeoffamiliar/generaltopicsusingappropriatelinkingdevicestoachieveaclearsequenceofideas.(Bloom'sTaxonomyLevel/s:3)
- Acquire sufficient language competency to express oneself in speech and writing with someconfidence,usingappropriatevocabularyandsimplegrammaticalstructuresthoughlexicallimitations and/or difficulty with formulation might be evident at times. (Bloom's TaxonomyLevel/s:2 &4)

LANG1011:CommunicationSkillsinEnglish

L	T	P	S	J	C
0	0	4	0	0	2

CommunicationSkillsinEnglish(Intermediate)isthesecondofthethree-levelgradedcoursesforadevelopmentalenhancementofcommunicationskillsinEnglish.Basedonthelearningoutcomesset in the beginner level syllabus, this course focuses on giving learners more exposure to the useof language for communicative purposes and equip them with next level skills (ref. Bloom'staxonomy) and practice in terms of complexity and cognitive engagement. This course alsoincludes inferential level of comprehension (listening and reading) that involves analysis andapplication of the language skills and decision-making skills while speaking/writing with anawareness for social and personality-based variations in communication. This course emphasizesguided writing through adequate tasks with pre and postcontextbuilding. The focus is onstimulationandapplicationofcriticalthinkinginadditiontoschematicthinkingforcommunicationinreal-lifesituations.

CourseObjectives

- Train learners to actively listen to short audio texts with familiar content; guided activitylike question-making and responding to others' questions based on the audio text wouldhelplearnersengageintransactionaldialogue;extendedactivitieslikeextrapolating/critiquingtheresponseswouldhelplearnersenhancetheirschematicthinking.(Bloom's TaxonomyLevel/s:2&4)
- Equip learners with strategies to read actively and critically and understand the writers'viewpoints and attitude by providing reading comprehension tasks using authentic textssuch as op-ed articles from newspapers, and reports on contemporary problems. (Bloom'sTaxonomyLevel/s:4&5)
- Helplearnersunderstandvariousaspectsandtechniquesofeffectivepresentations(group/individual) through demonstration and modelling, and enabling them to developtheirpresentation skillsby providing trainingin using the tips and strategies given.Learners would be encouraged to observe and express opinion on teacher-modelling.Reflectiononissueslikeanxiety,stage-fear,confidence,andlevelsoffamiliaritywithtopicandaudiencewouldbeaddressed.Practicewouldbegivenontone,pitch,clarityandotherspeech aspects. Detailed peer feedback and instructor's feedback would cover all thesignificantaspects.(Bloom's TaxonomyLevel/s:2&4)
- Enable learners to become aware of the structure and conventions of academic writingthroughreading,demonstration,scaffoldingactivities,anddiscussion.Correctiveindividual feedback would be given to the learners on their writing. (Bloom's TaxonomyLevel/s:2&3)

ListofTasksand Activities

S.No.	Tasks	Activities
1	Listeningtosubjectrelatedshortdiscussions/explanations/speechforcomprehension	Pre-reading group discussion, Silent reading(Note-making), Modelling (questioning), Post-readingreflection/Presentation
2	Askingforinformation:askingquestions relatedtothecontent,contextmaintaining modalities	Grouprole-playinacontext (i.e.Identifyingthe situationanddifferentrolesandenactingtheirroles)

3	Information transfer: Verbal to visual (familiarcontext), demonstration by teacher, learners' task(guidedwithscaffolding),learners'task(free), presentationandfeedback	Pairworkfordiscussion&feedback,Presentations,question-answer
4	Informationtransfer: Visualtoverbal(unfamiliarcontext); demonstration by teacher, learners' task(guided with scaffolding),learners' task (free),presentationandfeedback	Pre-readinggame/modelling,discussioninsmallgroups,individual writing,andfeedback
5	Introducing officials to peers and vice versa - Formalcontext	AV support, noticing, individual performance (3-4), pair work (in context), teacher modelling,group workforIntroducingselfandothers ina formalcontext
6	Introducing friends to family and vice versa - Informalcontext	Teachermodelling/AVsupport,noticingstructure & note-taking, Introducing friends andfamilyinaninformalcontext
7	Vocabularyincontext:Findclues inatextandusethemtoguessthemeaningofwords/phrases. Apply the newly learnt vocabulary incommunication(speakingandwriting) .	Comprehending verbal communication:Identifying the contextual clues in oral andwritten texts; guessing the meaning ofwords/phrasesincontext whilereadingtextsandlisteningtodiscussions/talks
8	A five-day journal (diary) writing based onlearnersreadingfromnewspaperonasingler elevant/current social issue. Individual oralpresentationandfeedbackfrompeersand instructor.	Note-making(groupwork),Discussion,Feedback
9	Follow the essentials of lectures, talks,discussions,reportsandother formsofacademicpresentations and mak2 individual and grouppresentations aided with images, audio, video,tabulardata,etc.	Making power point presentation aided withimages, audio, video, etc. with a small group bylisteningtoacademiclectures/talks/discussions, etc.
10	Self-reflection: Re-reading one's own drafts,identifyingerrors,correctingtheerrors,andgivingrationalizethe changes	Pre-taskdiscussion/modelling,Editingthetextsby careful reading and identifying the errors,peer-exchange(Pairwork), feedback/consolidation
11	Collaborative work (speaking and writing) insmall groups of 3 or 4 learners: discussing ageneral/discipline-specifictopic:creatingoutline,assigning specific roles to members of the group;and grouppresentationfollowedbypeerand instructorfeedback	Pre-taskmodelling(peer/teacher),generaldiscussion on structure, group work(collaboration),feedback
12	Independent reading of different text types usingappropriatereferencesourcesbyadaptingsuitablereading styles and speed. Focus on active readingforvocabulary:low-frequencycollocationsand idiomaticexpressions.	Brain-storming, mapping of key terms (contentspecific), readingandnote-making(individual),oralquestioning,discussion
13	Role-play (specific social and academicsituations): planning (making notes),understandingnuancesofspeakingincontext,coordinatingwithsituationalclues andfellow speakers/participants	Peer discussion for outline, A-V support,observing (teacher modelling), role play(guided),role-play(free),feedback
14	Writing instructions: Guidelines - Flowcharts - Procedurestobefollowed	Pre-taskreading,pairwork,teacher/peer-discussion,feedback

15	Speaking spontaneously on topics of interest andwritingshort structured essays onthesametopicsadopting appropriate academic conventions andgrammaticalaccuracy.	Reading for task preparation, note-making,speaking, reflection and corrective peer andteacherfeedback

ReferenceBooks

1. P.KiranmayiDutt,GeethaRajeevan.(2007).BasicCommunicationSkills.FoundationBooks.CUP
2. Harmer,J.(1998).HowtoteachEnglish.Longman
3. SanjayKumar &PushpLata.(2018).CommunicationSkills:AWorkbook.OUP.
4. CambridgeIGCSE:EnglishasaSecondLanguageTeacher'sBookFourthEdition.ByPeter Lucantoni.CUP(2014).
5. CambrdigeAcademicEnglish:AnIntegratedSkillsCourseforEAP(UpperIntermediate)ByMartinHewings,CUP(2012)
6. Richards,J.C.andBohlke, D.(2012).FourCorners-3.Cambridge:CUP.
7. HeadwayAcademicSkills:Reading,Writing,andStudySkillsStudent'sBook,Level-2bySarahPhilpot.OUP
8. Latham-Koenig,C. &Oxenden, C. (2014).AmericanEnglishFile.Oxfor:OUP.
9. McCarthy,M.&O'Dell.F.(2016).AcademicVocabularyinUse.Cambridge:CUP

OnlineResources

1. https://www.grammarly.com/blog/
2. https://www.nationalgeographic.org/education/
3. https://www.bbc.co.uk/teach/skillswise/english/zjg4scw
4. https://www.englishclub.com/
5. https://www.oxfordlearnersdictionaries.com/
6. https://dictionary.cambridge.org/
7. learnenglishteens.britishcouncil.org
8. https://freerice.com/categories/english-vocabulary
9. http://www.5minuteenglish.com/
10. https://breakingnewsenglish.com/
11. https://www.digitalbook.io/
12. https://librivox.org/

CourseOutcomes

- Understandthespeaker'spointofviewinfairlyextendedtalksongeneralordiscipline-specifictopics, and follow simple lines of argument in discussions on familiar contemporary issues.(Bloom'sTaxonomyLevel/s:3)
- "Readanddemonstrateunderstandingofarticlesandreportsonlimitedrangeofcontemporaryissuesinwhichthewritersadoptparticularstances.Alsoprovidesamplesofwrittencommunication containingfairlycomplexinformationandreasonsforchoices/opinions/stances.(Bloom'sTaxonomyLevel/s:2&3)"
- Makeshortpresentationsonalimitedrangeofgeneraltopicsusingslides,andengageinsmallgroupdiscussionssharingexperiences/viewsonfamiliarcontemporaryissuesandgivereasonsforchoices/opinions/plans.(Bloom's TaxonomyLevel/s:3&4)
- Writeclear,fairlydetailedtext(ashortessay)onalimitedrangeofgeneraltopics,andsubjectsof interest,and communicate clearly through email/letter to seek/pass on information or givereasonsforchoices/opinions/plans/actions.(Bloom'sTaxonomyLevel/s:3)
- Reflectonothers'performance,givepeer feedbackonfellowlearners'presentations,responsestowriting tasksand reading comprehensionquestions.(Bloom'sTaxonomyLevel/s: 5)

LANG1021:AdvancedCommunicationSkillsinEnglish

L	T	P	S	J	C
0	0	4	0	0	2

Communication Skills in English (Advanced) is the third of the three-level graded courses for adevelopmental enhancement of communication skills in English. Based on the learning outcomesset in the upper-intermediate syllabus, this course focuses on giving learners exposure to higherlevel of skills/input processing (ref. Bloom's taxonomy) and practice in terms of complexity andcognitive engagement. This course includes advanced level of comprehension i.e. anaytical,evaluative and extra-polative processing (listening and reading) and involves problem-solving,logicalreasoninganddecision-makingskillsintermsofapplicationofthelearning(speaking/writing)withanawarenessforsocialandpersonalitybasedvariationsincommunication. This course provides opportunities with activity-based practice of advanced oralandwrittencommunicativeskillsbesidesbuildingawarenessonthefinernuancesoflanguageuse for various purposes. This course emhasizes free writing through meaningfully engaging taskswith a pre and post context building. There is ample scope for application of critical thinkingthroughsimulatedactivitiesforeffective communication inreallife situations.

Course Objectives

1. Enablelearners to listen actively become aware of tone and attitude in speech,anddemonstrate their comprehension of fairly complex lines of argument presented by avarietyofspeakersintalks/presentations/discussions.(Bloom'sTaxonomyLevel/s:2&4)

2. Enablelearnerstobecomeawareoftoneandattitudeinwrittentexts,anddemonstratetheircomprehension of fairly complex lines of argument and points of view presented in avarietyoftextsbyequippingthemwithupperintermediatetoadvancedlevelreadingskillsandstrategies.(Bloom'sTaxonomyLevel/s:2&3)

3. Make effective presentations, engage in formal group discussions, and write structuredessays/ short reports to highlight the significance of actions/decisions/experiences, andsustain views by providing relevant evidence and argument. (Bloom's Taxonomy Level/s:3&4)

4. Equip learners with the skills and strategies to communicate effectively in speech andwriting using the language with a degree of fluency, accuracy and spontaneity, and fairlygoodgrammaticalcontroladoptingalevelofformalityappropriatetothecontext.Encourage learners to apply their knowledge of language andtheir communication skillsinreallife situations.(Bloom'sTaxonomyLevel/s:3&5)

List ofActivities&TasksforAssessment

S.No.	Tasks	Activities	CO
1	Evaluativeandextrapolativereadingofalongtext/short texts on a current topic related totechnology and society, identifying andquestioning the author's intention, post-readingdiscussioninsmallgroups, maintaininggroupdynamics,arrivingatacon sensus	Pre-reading group discussion, silentreading(Note-making),modelling(questioning),post-readingreflectionand brief presentation ofthoughts/ideas/opinionsonthethemeofthe text	3
2	Debate in pairs based on listening to tworecordedcontemporaryspeechesbywel l-known leaders in different fields. Peerfeedbackandinstructorfeedback.	Pre-record edaudio/videoforlistening, student check list for noticing keywords/concepts, pre-task orientation(byteacher),pairwork,feedback	1
3	Information transfer: Verbal to visual(unfamiliar context); demonstration byteacher, learners' task (guided with scaffolding), learners'task (free), presentation, question-answer(among students),modificationandfeedbackbeforeth efinalversionisdone	Pairworkfordiscussionandfeedback,presenta tions,question-answer	2
4	Information transfer: Visual to verbal(unfamiliarcontext);demonstration by teacher, learners' task (guided withscaf folding),learners' task(free) ,presentation, question-answer(among students), modification, editing, proof reading, andfeedbackbeforethefinalversionisdone	Pre-reading game/modelling,discussion in small groups,independentwritingandfeedback	4
5	Expressing opinion on a short argumentativetext(e.g. a journal article or a newspapereditorial) and justifying one's opinion/stance;focus on the use of appropriate conventionsofformalandpolitespeech, and managingbias	Listeningtogroupdiscussions/debates,reading news-paper articles on thecurrent issues and expressing opinionsin favour or against the topic (in GDs, debates or writing argumentative essays).	3
6	Role-play (complex social andacademic/professionalsituations):Focus onsignificant aspects of delivery including clarity, tone, and use of contextually appropriate vocabulary and conventions, observation,reflectivediscussion,andself-reflectivewriting	Reading newspaper/magazinearticles/blog posts on current socialissues, listening to talks/ discussions/ debate setc. And participating in role-plays using expressions appropriate to thecontext.	1
7	Collborative writing in groups of 3 -4 ontopics that would require data collection andreading followed by recorded peer-reflectionandpeer-feedback,group presentationand feedback	Pre-task modelling (peer), generaldiscussiononstructure,groupwork (collaboration), presnetation, peerfeedback,Open-class discussion	5
8	FormalGroupDiscussionontopicsofcurrentinterest and relevance; focus on effectiveparticipation, reflection on control overargument/counter argument,andadherencetotheconventionsoffor malGD	Noticing strategies from AVmodelling,teacherscafoldingthoughopen-house discussion, Note-making(Group work),Group Discussion (free),postperfromancediscussion,Feedback	2

9	Mind-mappingforadvancedreading,making correlationsacrosstexts,extendingauthor'spo intof view	Readingtexts onabstracttopics and comprehendingtheauthor's perspectiveby inferring the unknown words'meaning in the context and makingnotes usingmind-map strategyand presentingitorally.	3
10	Handlingquestionandanswersessionsafter presentations: justifying arguments, takingcounter-arguments, agreeinganddisgreeingwithrationale	Listeningtosomelectures,talks,and presentations in the academic seminarsand adapting some strategies to handlethe Q&A sessions using polite andformalexpressionstoagreeordisagree withthestatements.	1
11	Modellinganinterview:withapanel offourjudges(peers)	Pre-task activity fororientation/strategies (controlled/guided), Model interview(AV support), Group work (role play),interview in pair (one-to-one),Interviewingroup (many-to-one),oral correctivefeedback(peer/teacher)	2
12	Writing a short reflective report of an event - incident/meeting/celebration	Writing a report onmeetings/celebrataions/eventsetc.by actively involving in such events andgivingashortoralpresentation onthesame.	4
13	Speakingonabstractandcomplex topics beyondhis/herownareaofinterest/fieldofstu dy, using the language flexibly andeffectively.	Readingtextsonabstracttopicsand comprehending the author'sperspectives. Similarly, listening totalks and discussions on an abstracttopicofother disciplineandmaking short oralpresentationbysharingviewsandopi nions.	3
14	Self-relfectiononownspeechin context(recorded): tone, pitch, relevance,content;extendingthereflections /ideastoothers	Listeningtoselected general discussions (audios and videos) andobserving the language production.Recordingownspeechonsomegen eraltopic and providing a critical review(self-reflection)onitbyfocusingon thetone,expressionsandrelevanceoftheconte nt,etc.	1
15	Collaborativeandindividualtask:planning, preparing (preparing an outline, structure,setting objectives and presenting the plan ofaction) and executing a mini-project, andsubmittingabriefreportonthesamepeerandi nstructor feedback after the planning stageandoncompletionofthe miniproject	Pre-taskmodelling(peer/teacher), generaldiscussiononstructure, groupwork (collaboration), oral corrective,task distribution, presentation,feedback	5

ReferenceBooks

1. Latham-Koenig,C.&Oxenden,C.(2014).AmericanEnglishFile-5.Oxford:OUPRichards,
2. J.C.andBohlke,D.(2012). FourCorners-4.Cambridge:CUP.
3. CambrdigeAcademicEnglish:AnIntegratedSkillsCourseforEAP(Advanced)ByMartinH ewingsandCraigThaine,CUP(2012)
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5. Zemach, D. E., Islam, C. (2011). Writing Paragraphs: From Sentence toParagraph.Germany:MacmillanEducation.
6. Stewart, J. P., Fulop, D. (2019). Mastering the Art of Oral Presentations: Winning Orals,Speeches,andStand-Up Presentations.UnitedKingdom:Wiley.
7. Kroehnert,Gary.(2010).BasicPresentationSkills.Sidney:McGrawHill.
8. Cunninghum,S.& Moor,P.(nd).CuttingEdge(Advanced)With PhraseBuilder.LongmanPublishers.CUP
9. McCarthy, M&O'Dell,F. (2017).EnglishIdiomsinUse(Advanced).Cambridge:CUP.

OnlineResources

1. https://www.grammarly.com/blog/
2. https://www.nationalgeographic.org/education/
3. https://www.bbc.co.uk/teach/skillswise/english/zjg4scw
4. https://www.englishclub.com/
5. https://www.oxfordlearnersdictionaries.com/
6. https://dictionary.cambridge.org/
7. learnenglishteens.britishcouncil.org
8. https://freerice.com/categories/english-vocabulary
9. http://www.5minuteenglish.com/
10. https://breakingnewsenglish.com/
11. https://www.digitalbook.io/
12. https://librivox.org/

CourseOutcomes

- Listentoextendedlectures,presentations,anddiscussionsonawiderangeofcontemporaryissuesanddemonstrateunderstandingofrelativelycomplexlinesofargument.(Bloom's TaxonomyLevel/s:2)
- Make presentations using suitable AV aids and engage in formal group discussions on awiderangeoftopicsofcontemporaryinterest,demonstratingawarenessofstandard/widely acceptedconventions.(Bloom'sTaxonomyLevel/s:3)
- Readanddemonstrateunderstandingofthewriter'sstance/viewpoint inarticlesandreportsonawiderangeofcontemporaryissuesanddiscipline-specificsubjects.(Bloom'sTaxonomyLevel/s:2&4)
- Write analytical essays on a wide range of general topics/subjects of interest, and engageinwrittencommunication(emails/concisereports)toexchangerelativelycomplexinformation, giving reasons in support of or against a particular stance/point of view.(Bloom'sTaxonomyLevel/s:3&4)
- Complete a mini project that necessitates the use of fairly advanced communication skillstoaccomplish a variety of tasks andsubmita reportin the givenformat. (Bloom'sTaxonomyLevel/s:4&5)

CLAD1001:EmotionalIntelligence &Reasoning Skills(SoftSkills1)

L	T	P	S	J	C
0	0	2	0	0	1

Course Description:

Emotional intelligence is a set of skills that are thought to contribute to the appraisal of emotions in oneself and others. It can also help contribute to the effective regulation of emotions as well as feelings (Salovey & Mayer, 1990). In terms of emotional intelligence, self-awareness and self-management have to do with our ability to relate to ourselves. Social awareness and relationship management have to do with our ability to relate to others. Similarly, the ability to solve questions on Analytical Reasoning and Data Sufficiency is a critical area tested in almost all competitive examinations and admission tests. Upon completion, students should be able (1) to deal with their own emotions as well as the emotions of others and relate better with both. Using better knowledge of EI, students will also be able to set more meaningful goals for themselves, choose suitable time management techniques that work best for them and work in teams more effectively. (2) to apply different concepts, ideas and methods to solve questions in reasoning and data sufficiency

Course Objectives:

1. Use EI to relate more effectively to themselves, their colleagues and to others. Apply self awareness and self assessment (SWOT) to better understand and manage their own emotions. Apply social awareness to empathize with others and build stronger relationships with others.
2. Set meaningful goals based on their strengths and weaknesses and apply time management techniques, such as Q4 organizing to put first things first.
3. Manage conflicts and work in teams in an emotionally intelligent manner.
4. Solve questions on non-verbal and analytical reasoning, data sufficiency and puzzles

CourseOutcomes

- Studentswillbeabletorelatemoreeffectivelytothemselves,theircolleaguesandtoothers
- Studentswillbeabletosettheir shorttermandlongtermgoalsandbetter managetheirtime
- Studentswillbeabletomanageconflicts inanemotionallyintelligentmannerandworkinteamseffectively
- Students will be able to solve questions based on non-verbal and analytical reasoning, datasufficiencyandpuzzle

Unit	Topics	Hours
1	SelfAwareness &SelfRegulation:IntroductiontoEmotionalIntelligence, *Self Awareness:* Self Motivation, Accurate Self Assessment (SWOTAnalysis),SelfRegulation:*SelfControl,Trustworthiness&Adaptability*	3
2	SocialAwareness&RelationshipManagement:*SocialAwareness:*Importance, Practising Social Awareness, Building Relationships, HealthyandUnhealthyRelationships,RelationshipManagementCompetencies - Influence, Empathy, Communication, Types of Conflicts, Causes, ConflictManagement	3
3	SocialMedia:Creatingablog,useofmessagingapplications,creatingawebsitetoshowcaseindividualtalent,creationofaLinkedInProfile	2
4	GoalSetting&TimeManagement:SettingSMARTGoals,TimeWasters,Prioritization,UrgentVsImportant,Q2 Organization	3
5	Teamwork:TeamSpirit,DifferenceBetweenEffectiveandIneffectiveTeams,CharacteristicsofHighPerformanceTeams,TeamBonding, Persuasion,TeamCulture,BuildingTrust,EmotionalBank Account	4
6	VerbalReasoning:Introduction,Coding-decoding,Bloodrelations, Ranking,Directions,GroupReasoning	6
7	AnalyticalReasoning:CubesandDices, CountingofGeometricalfigures	3
8	LogicalDeduction:Venndiagrams,Syllogisms,DataSufficiency,Binarylogic	4
9	SpatialReasoning:Shapes,PaperCutting/Folding,Mirrorimages,WaterimagesandRotationoffigures	2
	TotalHours	30

References:

1. Verbal Ability & Reading Comprehension by Arun Sharma and Meenakshi Upadhyay
2. Study material for CAT, SAT, GRE, GMAT by TIME, CareerLauncher and IMS etc.
3. Quantitative Aptitude by R S Agarwal S Chand Publications
4. Quantitative Aptitude by Pearson Publications

CLAD1011:LeadershipSkills&QuantitativeAptitude(SoftSkills2)

L	T	P	S	J	C
0	0	2	0	0	1

Course Description:

Communication Skills is having the ability to convey information to others so that messages are understood and outcomes delivered. Some essential qualities of Communication Skills include understanding the needs of others, clearly communicating messages, adapting the communication style, and using a range of communication methods. Presentation Skills is having the ability to confidently deliver an engaging message to a group of people which achieves the objectives. Some essential qualities of Presentation Skills include a thorough preparation of content, structuring content logically, managing nerves, engaging your audience, delivering presentation objectives, positively influencing the audience, and responding to audience needs. Tackling questions based on numbers, arithmetic, data interpretation and puzzles requires the application of different rules and concepts of numerical computation, numerical estimation, and data estimation.

Course Objectives:

1. Learn and apply, through different individual and group activities, different ideas and skills to communicate in a positive and impressive manner.
2. Apply the goal setting process (based on SWOT) and Q2 organizing for effective time management.
3. Apply different concepts in numbers, numerical computation and numerical estimation to solve questions that often appear in various competitive examinations and admission tests.
4. Apply different concepts for tackling questions based on data interpretation, progression and series that are frequently given in various competitive examinations and admission tests.

CourseOutcomes

- Students will be able to communicate 'one-on-one' and 'one-on-many' confidently using bothverbal and non-verbal messages and deliver impressive talks/ presentations to a group bothwithandwithoutthe use ofPPTsandcreateposters,advertisements,etc.
- Students will be able to apply the the rational model of problem solving and decision makingintheirproblemsolvinganddecisionmakingefforts.
- Students will be able to solve questions based on numbers and arithmetic given in variouscompetitive examinations
- Studentswillbeabletosolvequestionsbasedondatainterpretation,progressionsandseries.

Unit	Topics	Hours
1	Communication Skills:*The Communication Process,* Elements of InterpersonalCommunication, *Non-Verbal Communication:* Body Language, Posture, EyeContact, Smile, Tone of Voice, *Barriers to Communication.*Effective ListeningSkills:ActiveListening,PassiveListening,AskingQuestions,Empathizing,BeingNonJudgemental,Being OpenMinded,MassCommunication:DesignofPosters, Advertisements,notices,writing formalandinformalinvitations	5

2	Presentation Skills: Seven Basic Rules for Effective Presentation: Be Passionate,Focus on Audience Needs, Focus on the Core Message, Use Body Language andVoice,StartStrongly,OrganizingIdeas&UsingVisualAids:SPAMModel,Effective OpeningandClosingTechniques,GuyKawasaki'sRule(10-20-30Rule),OvercomingStageFear,StoryTelling	3
3	ProblemSolving&DecisionMaking:DifferenceBetweentheTwo,StepsinRationalApproach to Problem Solving: Defining the Problem, Identifying the Root Causes,GeneratingAlternativeSolutions,EvaluatingandSelectingSolutions,Implementing andFollowing-Up,CaseStudies	3
4	Group Discussion: Understanding GD, Evaluation Criteria, Nine Essential Qualitiesfor Success, Positive and Negative Roles, Mind Mapping, Structuring a Response,MethodsofGeneratingFreshIdeas	4
5	NumberTheory:NumberSystem,Divisibilityrules, RemaindersandLCM&HCF	3
6	NumericalComputationandEstimation-I:ChainRule,RatioProportions,Partnerships&Averages,Percentages,Profit-Loss&Discounts,Mixtures,Problems onNumbers&ages	6
7	DataInterpretation:InterpretationandanalysisofdatainTables,Caselets, Line-graphs,Pie-graphs,Box-plots,Scatter-plotsandDataSufficiency	3
8	MentalAbility:Series(Number,Letterand Alphanumeric),Analogy(Number,LetterandAlphanumeric)andClassifications	3
	TotalHours	30

References:

1. Verbal Ability & RReading Comprehension by Arun Sharma and Meenakshi Upadhyay
2. Study material for CAT, SAT, GRE, GMAT by TIME, CareerLauncher and IMS etc.
3. Quantitative Aptitude by R S Agarwal S Chand Publications
4. Quantitative Aptitude by Pearson Publications

CLAD1021: Verbal Ability & Quantitative Ability (Soft Skills 3)

L	T	P	S	J	C
0	0	2	0	0	1

Course Description:

Vocabulary is an important part of verbal ability. An understanding of word formation, prefixes, suffixes and roots is necessary to remember and use a vast repository of words. Approaching words through word families and other ways of groupings is an effective way of gaining mastery over vocabulary. Understanding and getting acquainted with the different rules and exceptions in the use of grammar and structure, especially from the relevant examination point of view, is crucial to cracking questions given in many competitive tests. Similarly, improving reading comprehension skills and test taking abilities in this area takes time and effort, especially given the fact that most students do not possess strong reading habits. In so far as quantitative aptitude is concerned, students need to develop a strong foundation on the basic mathematical concepts of numerical estimation, geometry, mensuration, data sufficiency, etc. to be able to crack different round 1 tests of major recruiters and admission tests of top Indian and foreign universities.

Course Objectives:

1. List and discuss the different word formation methods, word denotation, connotation, collocation, etc. and introduce selected high frequency words, their antonyms, synonyms, etc
2. Apply different advanced reading skills to solve questions based on author's tone, main ideas and sub-ideas, inferences, parajumbles, etc. that are frequently asked in various competitive exams and admission tests.
3. Solve different types of questions based on vocabulary, such as word analogy; structure, grammar and verbal reasoning; introduce common errors and their detection and correction.
4. Solve questions on numerical estimation, mensuration, data sufficiency based on quantitative aptitude. This includes questions on time and work, time and distance, pipes and cisterns, lines and angles, triangles, quadrilaterals, polygons and circles, 2 & 3 dimensional mensuration.

1. **Vocabulary Builder:** Understanding Word Formation, Prefixes, Suffixes and Roots, Etymology, Word Denotation, Connotation and Collocation, Synonyms and Antonyms

2. **Reading Comprehension:** Advanced Reading Comprehension: Types of RC passages, Types of Text Structures, Types of RC Questions: Distinguishing Between Major Ideas and Sub Ideas, Identifying the Tone and Purpose of the Author, Reading Between the Lines and Beyond the Lines, Techniques for Answering Different Types of Questions

3. **Para Jumbles:** Coherence and Cohesion, Idea Organization Styles, Concept of Mandatory Pairs and Its Application: Transitional Words, Antecedent-Pronoun Reference, Article

Reference, Cause and Effect, Chronological Order, General to Specify, Specify to General, Idea-Example, Idea-Explanation, Etc.

4. **Grammar Usage:** Rules Governing the Usage of Nouns, Pronouns, Adjectives, Adverbs, Conjunctions, Prepositions and Articles

5. **Numerical Computation and Estimation - II:** Time and Work, Pipes and Cisterns, Time and Distance, Problems on Trains, Boats and Streams, Races and Games of Skill, Simple Interest & Compound Interest

6. **Geometry:** Lines and Angles, Triangles, Quadrilaterals & Polygons, and Circles

7. **Mensuration:** 2-Dimensional Mensuration (Triangles, Quadrilaterals and Circles), 3-Dimensional Mensuration (Cubes, Cuboids, Cylinder, Cone, Sphere)

Course Outcomes:

1. List and discuss word formation methods, selected high frequency words, their antonyms, synonyms, etc.
2. Analyze reading passages and quickly find out the correct responses to questions asked, including para jumbles, by using reading skills like skimming, scanning, reading between the lines, etc.
3. Solve different types of questions based on vocabulary, structure, grammar and verbal reasoning
4. Solve questions on numerical estimation, mensuration, data sufficiency based on quantitative aptitude

References:

1. Verbal Ability & Reading Comprehension by Arun Sharma and Meenakshi Upadhyay
2. Study material for CAT, SAT, GRE, GMAT by TIME, CareerLauncher and IMS etc.
3. Quantitative Aptitude by R S Agarwal S Chand Publications
4. Quantitative Aptitude by Pearson Publications

CLAD1031: Practicing Verbal Ability & Quantitative Aptitude (Soft Skills 4)

L	T	P	S	J	C
0	0	2	0	0	1

Course Description:

A sound knowledge of the rules of English grammar, structure and style and its application in detecting errors in writing are important areas of Verbal Ability frequently tested as a part of the written test in many competitive examinations and admission tests of major recruiters and universities respectively. This module focuses on all important areas of grammar and structure commonly asked in major tests, such as GMAT, CAT, XLRI, CRT, etc. Similarly, in the area of Quantitative Aptitude, different kinds of questions are asked from Combinatorics (Permutations & Combinations, Probability], Cryptarithmetic & Modular Arithmetic (Cryptarithmetic, Application of base system (7, 24), Clocks (Base 24), Calendars (Base 7), and Mental Ability (Number series, Letter series & Alpha numeric series, Analogies (Numbers, letters), Classifications, Algebra (Exponents, Logarithms, Problems related to Equations, Special Equations, and Statistics) . This module focuses on all these areas by building on what the students already learnt in their earlier studies.

Course Objectives:

1. Apply the rules of grammar to solve questions in Error Detection, Sentence Correction and Sentence Improvement.
2. Apply the rules of structure to solve questions in Error Detection, Sentence Correction and Sentence Improvement, Fill-in-blanks and Cloze Passages.
3. Explain methods of solving problems in Combinatorics (Permutations & Combinations, Probability], Cryptarithmetic & Modular Arithmetic (Cryptarithmetic, Application of base system (7, 24), Clocks (Base 24), Calendars (Base 7)]
4. Explain how to solve questions in Mental Ability (Number series, Letter series & Alpha numeric series, Analogies, Numbers, letters, Classifications] and Algebra (Exponents, Logarithms, Problems related to Equations, Special Equations, Statistics)

1. Error Detection: Pronouns, Conjunctions, Prepositions and Articles
2. Error Detection: Tenses and their Uses
3. Sentence Correction: Subject-Verb Agreement, Antecedent-Pronoun Agreement, Conditional Clauses
4. Sentence Correction: Modifiers (Misplaced and Dangling) & Determiners, Parallelism & Word Order, and Degrees of Comparison
5. Combinatorics: Permutations & Combinations, Probability
6. Crypt arithmetic & Modular Arithmetic: Crypt arithmetic, Application of Base System (7, 24), Clocks (Base 24), Calendars (Base 7)
7. Algebra: Exponents, Logarithms, Word-problems related to equations, Special Equations, Progressions, Statistics

Course Outcomes:

1. Identify and correct errors in English grammar and sentence construction
2. Identify and correct errors in Structure, Style and Composition
3. Solve problems in Combinatorics, Cryptarithmetic, and Modular Arithmetic
4. Solve problems in Mental Ability and Algebra

References:

1. Verbal Ability & Reading Comprehension by Arun Sharma and Meenakshi Upadhyay
2. Study material for CAT, SAT, GRE, GMAT by TIME, CareerLauncher and IMS etc.
3. Quantitative Aptitude by R S Agarwal S Chand Publications
4. Quantitative Aptitude by Pearson Publications

VEDC1001:VentureDevelopment

L	T	P	S	J	C
0	0	0	2	0	2

Course Description

In this course, you will discover your deeper self in terms of how you might contribute to society by creating exciting new products and services that can become the basis of a real business. Your efforts, creativity, passion, and dedication to solving challenging problems are the future of our society, both in your country and worldwide.

The course is divided into four sections:

1. Personal discovery of your core values and natural skills
2. Ideation and improving the impact
3. Business model design for the innovation
4. Presenting your idea in a professional manner suitable for a new venture pitch

Eachsectionhaskeyframeworksandtemplatesforyoutocomplete,improvingyourideastepbystepuntilthefinalpresentation.

First, you will discover your personal values and emerging areas of knowledge that are the foundations of any successful company. Next, you will learn how to develop insight into the problems and desires of different types of target customers and identify the design drivers for a specific innovation. Then, you will learn specific design methods for new products and services. And as important as the product or service itself, it is a strategy for monetizing the innovation –generating revenue, structuring the operating costs, and creating the operating profit needed to support the business, hirenewemployees,andexpandforward.

Thisprojectisintendedtobeforteamsofstudents.Innovationandentrepreneurshipareinherentlyteam-based.This course will give you that entrepreneurial experience.

This is the beginningofwhatmightbethemostimportantjourneyofpersonalandcareerdiscoveryso far in your life, one with lasting impact. This is not just a course but potentially an important milestone in your life that youremember warmlyintheyearstocome.

Course Objectives

Students will have the opportunity to:

- Discovery whoyouare –Values, Skills, andContributiontoSociety
- Understandhowcreativityworksandpermeatestheinnovationprocess
- Learnthebasicprocessesandframeworksforsuccessfulinnovation.
- Gainexperienceinactuallygoing throughtheinnovationprocess.
- Conductfieldresearchtotestorvalidateinnovationconceptswithtargetcustomers.
- Understand innovation outcomes: issues around business models, financing for start-ups,intellectualproperty,technologylicensing,corporateventures,andproductlineorserviceextensions.

Course Materials

- MeyerandLee(2020),PersonalDiscoverythroughEntrepreneurship,TheInstituteforEnterprise Growth,LLC.Boston,MA., USA
- Additional readings
- Additionalvideos,includingcasestudiesandcustomerinterviewingmethods.

Expectations of you in the classroom: Each student is expected to be prepared to discuss thereadings/exercises assigned for each class. It's not optional! Students will be randomly asked todiscussandsummarizethematerial.Yourlearning–andyoursuccess—inthiscourseareheavilydependentuponyourwillingnesstoparticipateactivelyinclassdiscussion.Yourclass participationwillbeassessedonthequalityandconsistencyofyoureffortineachandeveryclass.

Lateassignments:Lateassignmentsaresubjecttogradepenalty.Latenesswillonlybeconsideredfor gradingifpriornotice was giventothe instructorbeforethe duedate.

Presentation: Achieving success with an innovative idea requires you to package and present theidea in a crisp, creative, and powerful manner. The activity of presenting helps you to internalizeyour idea -- as you talk about it and obtain feedback – and improve upon it. There would be twomajor presentations during the course, plus a series of other smaller unscheduled presentations ofworkinprogress orcoursematerial.Prepare,practice,andsucceed!

Timespentoutsideofclass:Thecourseishands-onandrequiresstudentstoconductfieldresearchthroughdirect interactionswithpeople(interviews/surveys)andonline/inthelibrary.Specifically,thecourserequiresthatstudentsconductstudieswithpotentialtargetusersandstakeholders.Youmust be prepared to go out of your comfort zone to dig for information. You will need to searchforinformationonlineandarrangetomeetortalktorelevantpeoplewhomayhavetheinformationyouneed.

GroupProjectOverview

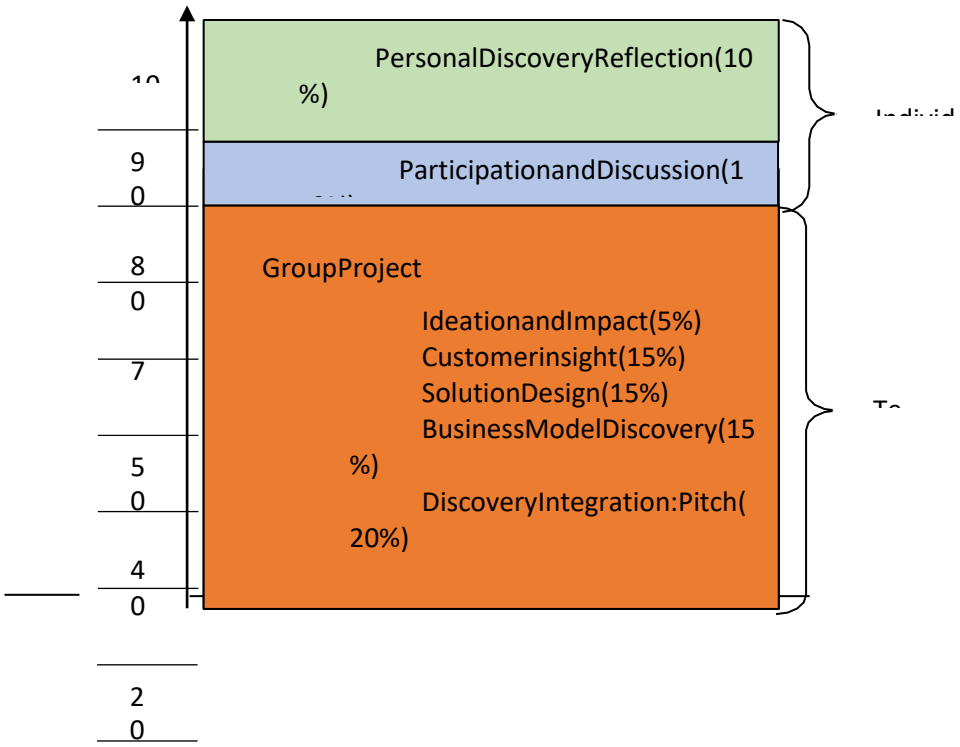
This is a semester length project and the cornerstone component of the course. The group projectwillgiveyoutheopportunityto applythecourseconceptsto arealsituation.Youwilllearnaboutthe entrepreneurship for your own business or your work in organizations. Even if you are notgoingtobeanentrepreneur,youneedtoknowhowtoidentifytheopportunities, whotopersuadepeople,andhowtocreate economic andsocialvaluesin manydifferentcontexts.

Talking to customers is one of the most important steps in investigating your business becauseyourentrepreneurialvisionmust correspondtoatruemarketopportunity.Withyourgroup,select5-6 potential customers willing to be interviewed. They should represent a cross-section of ourtargetmarketandshouldprovideinformationthathelpsyourefine youropportunity.Thisisnotasimple survey: you are seeking in-depth understanding of the lifestyle and behaviors of yourcustomer that can help you shape your opportunity. Please remember, you are not simply lookingto confirm you have a great idea, but to shape your idea into a great opportunity. You willmaximize your chances for success and your ability to execute your business cost-effectively bymakingearly(ratherthanlater)changes toyourconcept. "Design" is fun, particularly when you merge customer insight with your own creativity.Enjoy!Inthisbook,weprovidestructuredmethodstobeanactivelistenerand learner fromcustomersaswellas aproductorservicedesigner.

Business modeling is not as hard as it might sound.This is the design of your business – how itcharges customers, what is spent producing and selling products or services, and the money thatcan bemadeforeachunitsold.We keepitsimple–soshouldyou.

For the final outcome, you will be required to come up with Pitch that can used as the basis foractually starting a company based on an impactful innovation. Once again, we provide a specificformat and tools for creating a compelling Pitch. We also want you to think about an excitingproposition that is more than just making money, but rather, one that helps society. This will giveyou innovation and venture concept greater lift with customers – and it will also make you feelbetter,deepinside.

Project ComponentsandGrading



[20Stepsand activitiesinthiscourse]

Deliverables

There are a number or different deliverables for the course that follow the templates presented inthe book, as applied to your own venture idea. Do your best to keep up with the timeline of theclass; do not fall behind! Later templates build on the learnings from prior templates.Make themost of your team! Everyone needs to pitch in. In no case, should one person be taking the leadon all templates.Rather,different team members should take the lead on specific deliverables.Coordinatewell.Letyourteacherknowifateammemberisnotcarryinghisorherload.

SpecificDeliverables

IdeationandImpactHand-inPackage:5%oftotalgrade
clearlywritten,withaone-pageexplanationfortheteam'sdecision

- Problemto SolveTemplates,Step4,Page 62and 63(witha page ofadditionalexplanationifneeded)
- IdeaImpactTemplate,Step6, Page69(withapageofexplanation)

Customer Interviews and Insight Hand-in Package:15%(1st RoundofCustomerInterviews)

- CustomerInterviewsTemplate,Step7,Pages75-78,plusaddadditionaltemplateformsforeachadditionalcustomerinterview.The more,the better.
- IdeaReshapingTemplate,Step7,Pages84and85.Integrationintooverallconclusions. Howhaveyouimprovedyouroriginalideathroughcustomerresearch?
- LatentNeedsTemplate,Step7,Page93 – whatarethefrustrationsofusersthatarenotsolvedbycurrentproductsorservices?
- FullUseCaseTemplate,Step7,Page99– howdoyoucustomers'needschangeoverthefullusecase,andwhat innovativeideascanyouproposeateachstepoftheway?

Concept Design(and Test) Hand-inPackage:15%

- CustomerValuePropositionTemplate:Step8,Page107.Thisbecomesthelandingpointfor whatyoulearnedinyourcustomerinterviews.
- CompetitiveAnalysisTemplate:Step8,Page109.(UsetheWeboractualstores/dealers)
- ProductVisionandSubsystemDesignTemplates:Step10,Pages121and126(Youcanadd additionalpageswithdesignillustrationandexplanationsofyourbubblechart)
- Reality Check Survey Template and Results: Step 11, Page 141, 143-144(Youcanusemorethan2pagesforreportingthe results.)

BusinessModelDesignHand-inPackage:15%

- IndustryAnalysisTemplates:Step12,Pages153and 154
- Illustratethe BusinessModelTemplate:Step13,Page 170

(Usedifferentcoloursorlinepatternstoshowtheflowsofproduct,money, andinformation)

- RevenueModelTemplate:Step 14,Page 177
- Operating ModelTemplate:Step15,Page 187
- Customer JourneyTemplate:Step 16,Page195
- Validating theBusinessModelTemplate:Step17,Pages199and 200

DiscoveryIntegrationHand-inPackage:20%

- BusinessandSocialVisionImpactStatementTemplate:Step18, Page210.
- PerUnitProfitabilityTemplate:Step19,Page229
- YourVentureStoryPitch: Step 20(PowerPoint)
- OverallPitchDesignTemplate:Page264

Assemblethetemplatesfrom allyourworkabove,plus any others thatyoufoundparticularly meaningful, and from these, create your Team's Innovation Pitch.The bookhaslistsspecifictemplatesthatfitforeachpartofthefinalpresentation.

Do not just regurgitate the templates in your pitch; rather, take the key points from themto create your own, unique presentation.The templates help you think – but most are toocomplextopresenttooutsidepeoplewhohavenottakenthecourse.Therefore,designthispitchasif youpresentingtoa newsetofinvestors.
And don't forget to add an attractive title page with your team members names and emailaddresses!You can also add an Appendix at the very back with particularly interestinginformation, such as industry data or the results of your customer interviews and RealityCheck.

IndividualInnovationAssignments

You will be required to submit two Reflection Journalsas well as a maximum two pages doublespaced Synthesis, Integration andApplication paper by email atthe Week 4 andWeek 14respectively.Pleasenote,thisexerciseisnotabout regurgitating the courseconcepts.

(1) PersonalDiscoveryReflectionJournal(10%)

At the beginning of this semester, you will have a time to think about your self (who youare, what you are good at, what areas you want to contribute on) using a couple oftemplates. After that sessions, you will have a quiet moment to think about yourself, yourcareer, and your happiness in your life. Please write 2-page reflectional journal what youfeelandlearningthroughthepersonaldiscoverysessions.

(2) InsightLearningReflectionJournal(10%)

Attheend ofthissemester,you areto prepareashort reflectionofimpressivesessionsaswell as related activities outside the classroom. Specially, (1) reflect on the key pointsfrom lectures, reading, discussion, guest speakers, and interviews, (2) apply this to yourownsituation,and(3)outlinewaysthatyouintendtousethisknowledgeinthefuture.

CourseSchedule

Week	Session	Topicsand Steps	KeyCONCEPTSIntroducedinClass	ClassFocusActivity
1	1	**Course Overview**	1. Whyisentrepreneurshipimportant? 2. WhatisPersonalDiscoverythroughEntrepreneurship? 3. Four Stages; Personal Discovery,SolutionDiscovery,BusinessModelDiscovery,DiscoveryIntegration 4. Preparation(findinginterestingareas)	**LectureandDiscussion**
	2	**Personal Discovery**(Step01,Step 02)	1. PersonalValues 2. StrengthandWeakness	Individual: · Workwiththetemplatesprovidedonpages: · Corevalues:22,23 · Skills:27,28,29,30,31 · SocietalContribution:33,34
2	3	**Find Teammates**(Step03)	1. Review Problem Area Template at thebeginning of the book to findclassmates who want to work on thesameproblemarea. 2. Findteammates (1) Sharedvalues (2) Levelsofcommitment (3) Skillsandexperiences(SameorDifferent?)	Problemtemplate: Page9 · Talk to your classmates andfind teammates.See whowantstoworkoninthesameproblem space, with a sharedvisionofsolutions,andcomplementaryskillsets. · Sit back and assess:Teamtemplates on Pages 44, 45, and46. · Preparetopresent yourteam, the problem it is going totackle,anditscollectiveskills.
	4	**Define Purpose** (Step 04) **Create Mission** (Step05)	1. MethodsfordefiningandrefiningaventureŠspurpose 2. DefiningaVentureŠsPurpose 3. CreatingaVisionStatement	Team: · Purpose and MissionTemplates:Pages49 and52 · Bepreparetopresenttotheclass. · PersonalDiscoveryReflectionJournalDue

Week	Session	Topicsand Steps	KeyCONCEPTSIntroducedin Class	ClassFocusActivity
3	5	**Ideation &Impact**(Step06)	IdeationMethods · Anin-classideationexercise	Team: · Problem to SolveTemplates,Step4, Page 62,and 63
	6		IncreasingtheImpactofanIdea. (The Eat-Your-Coffee Video – a goodexample ofideation)	Team: · IdeaImpactTemplate, Step6,Page69
4	7	**User Insights Frameworks**(Step07)	· Identifyandfindtherighttarget users. · Interviewstyleandmethods · TheCustomerIntervie wtemplate.	Team: · CustomerInterviewsTemplate,Step7,Pages75 · Editinterviewtemplatefor yourproject.
	8		Ladderingmethodsforinterviews	Team: · LatentNeedsTemplate, Step7,Page93
5	9	**User Insights CustomerInterviews** (Step07)	· Findinglatentneeds · Fieldworkcheck-in	Team: · LatentNeedsTemplate, Step7,Page93 · Fieldwork–customerinterviewing
	10		· Thinkaboutinnovationacrossthee ntire usecase · Fieldworkcheck-in	Team: · FullUse Case Template,Step7,Page99 · Fieldwork–customer interviewing
6	11	**User Insights Interpreting Results**(Step07)	· Interpretingcustomerintervie wresults · Fieldworkcheck-in	Team: · Fieldwork–customerinterviewing · Alsotalktoretailers/dealersif appropriate
	12		· IdeaReshapingbasedonCustomerInterviews · Fieldworkcheck-in	Teams prepare results of results from customer interviews and how the original ideas havebeen reshaped&improved.
7	13	**User Insights Inter preting Results** (Step07)	· CustomerResearchReports · Implicationsforproductandservice design	· Teams prepare PPTs for class presentation · **Customer Insight Template Hand-in Package**
	14			

Week	Session	Topics andSteps	Key CONCEPTS Introduced in Class	ClassFocusActivity
8	15	**Concept Design** (Step08)	· DefiningCustomerValue · UnderstandingCustomerValueProposition	Team: · Customer ValueProposition · Template:Step 8, Page107 · DrafttheCVP
	16		· PresentationandreviewofCVPs	Team: · CompleteCVP
9	17	**Competitive Analysis and Positioning**(Step08)	· UnderstandingofCompetitiveMatrix · Competitivepositioning:creatingyourseparatespace	Team: · Identify major competitors,anddimensionsfor analysis · Template:Step 8,Page109
	18		· PresentationsofCompetitiveAnalysesand Positionings	Team: · Performthecompetitive analysisandpresentresults,including positioning
10	19	**Product LineStrategy** (Step09)	· Productlineframework:good,better,best on underlying platforms, plusapplicationtoServices.	Team: · Identifygood,better,bestvariations based on theunderlyingconcept. · Productlinetemplate:Page115
	20	**ProductVisioningSubsystemDesign, andPrototypeSketch**(Step10)	· Thestructured bubblechart,showingimplementation options and theteam'schoices · Prototypesketching (TheBluereoVideoisagoodexample of iterative prototyping driven bycustomerdiscovery.)	Team: · Prototype sketch, and forWeb apps, a wireframe.For physical products, aninitialbillofmaterials. · Underlyingbubblechartshowingyourdecisionprocess. · Product Vision andSubsystem DesignTemplates:Step10,Pages 121 and 126
Week	**Session**	**Topics andSteps**	· **KeyCONCEPTSIntroduced inClass**	**TeamorIndividual Activity**
11	21	**Reality Check** (Step11)	· The purpose of the Reality Check,testingtheproduct concept,channelpreferences,and muchother.	Team: · Reality Check SurveyTemplate and Results: Step11,Page 141,143-144

	22		· Guidance on the number or additionalcustomers forthe realitychecksurvey · Howtoanalyzeandinterprettheresults	· Customize the RealityChecktemplatefo ryourventure. · Doaquickroundofcustomersurveying.Aim for12moreinterviews.
12	23	**Industry Analysis** (Step12)	· TeamreportsonRealityCheckResults · Examinemajor componentsofanIndustryAnalysis · ReviewTemplates	Team: · Prepareand presenttheresults of your realitycheck,plusanypivotsyouwishtomake. · **ConceptDesign(andTest)Hand-inPackage** · Industry AnalysisTemplates:Step12,Pages 153 and 154s
	24	**Business Model** (Step13)	· DefiningtheBusinessModel: · Lectureonbasic structureanddifferenttypes. · Illustrating itastheflowofproduct,money,andinformation.	Team: · BusinessModelIllustration Template, Step 13, Page170

Week	**Session**	**Topics andSteps**	· **KeyCONCEPTSIntroducedinClass**	**TeamorIndividualActivity**
13	25	**Business Model** (Steps 14,15, 16,17)	· RevenueandExpenses · The keydecisionpointsintheRevenue Model · The keydecisionpointsintheOperatingModel · DesigningtheCustomerJourney · Validating the Business Model(The Polka Dog Bakery Video: anexample of creating a new retailexperience,plusnewproducts.)	Team · Step14, Page177 · Step15, Page187 · Step16, Page195 · Step17,Pages199and200 · Validate the Revenue andOperatingModelbytryingto have phone calls with afew Sellers andManufacturersto validating pricing,channels,andcosts.
	26			

14	27	**Impact Visioning** (Step18)	· Developclearstatementsforbusinessandsocietalimpact. · Look at good existing examples ofcompaniesthatdoboth.	Team: · Startintegratingyourresearch and templatestowards the finalpresentation,providedinStep20,Page264 · **BusinessModelDesign Hand-inPackage**
	28	**Creating Value** (Step19)	· Develop a project of the profitabilityin make low volumes for a product, aservice,andaWebapp. · Discuss applications of theframeworktoyourventure.	Team: · Develop and present Unitof 1 Economics Template,Step19,Page229 · Keep working onthe Finalpresentation

Week	**Session**	**Topics andSteps**	**KeyCONCEPTSIntroducedinClass**	**TeamorIndividualActivity**
15	29 30	**Tell YourStory**	· PresentationFormatandStyle · Format: (1) TitleSlidewithnamesandcontactinformation (2) TheTargetCustomerandtheProblemtobeSolved (3) TheMarketOpportunity (4) The InnovationStory (5) TheBusiness ModelStory (6) TheCustomer Journey (7) The Team (8) TheProposedActionSteps. (9) Appendices (if needed ordesired) · If you have built a prototypeduringtheclass,please bring itandshowittous! (The Fortify Video is a goodexampleofhowagoodtechnicalidea can translate into a businessmodel, andnext,intoawell-fundedventure.)	Team: · ThePPT Presentation  · Practice, practice,practice! · Not too many wordsononeslide · Usepictures · Use templatetodevelopyourthinking,but try to create slidesthat arenotjust thetemplates.
Final CourseDeliverables			Dueonthe Mondayafterthe weekendofthefinalclassmeeting.	**Team:YourVenturePPTs** **Individual:InsightLearning ReflectionJournal**

Course Outcomes

1. Identify one's values, passions, skills and their will to contribute to society
2. Formulate an idea and validate it with customers
3. Demonstrate prototyping and analyze the competition for the product
4. Create business models for revenue generation and sustainability of their business
5. Come up with a pitch that can used as the basis for actually starting a company based on an impactful innovation and societal impact

DOSP1001: Badminton

L	T	P	S	J	C
0	0	0	2	0	2*

This course provides instruction and the opportunity for participation in sports and physical fitness activities. Skills, strategies, rules, and personal wellness goals are included as appropriate. This course will provide students with an understanding of the fundamental concepts of the physiological functions and training principles associated with the chosen sport.

Course Objectives:

1. Understand training principles used in the sport
2. Demonstrate knowledge of the game in a recreational /competitive play setting
3. Organize an event around the sport
4. Demonstrate concepts of warm up, game conditioning, training plans

Course Outcomes:

1. Learn to play Badminton
2. Understanding ofthe fundamental concepts such asrules ofplay, game variations
3. Understanding ofthe governing structure andadministrationofthe sport
4. Understand the event management ofthe sport
5. Apply sport concepts into anactive physical lifestyle

List of Activities:

1. Watch a sport documentary / training video / game history
2. On field coaching and demonstration session
3. Guided practice and play
4. Event management & game officiating
5. Friendly competitions and structured matches

Instructional Plan:

1. Introduction to Badminton - History and development
2. Rules of the Game, Play Area & dimensions
3. Fundamental Skills - Badminton: Grips - Racket, shuttle
4. Sports Specific fitness and warmup drills
5. Stances and footwork
6. Badminton Gameplay: Service, Forehand, Backhand
7. Preparatory Drills and Fun Games
8. Game Variations: Singles/ Doubles/ Mixed

Reference:

1. Handbook of the Badminton World Federation (BWF)

DOSP1011: Chess

L	T	P	S	J	C
0	0	0	2	0	2*

This course provides instruction and the opportunity for participation in sports and physical fitness activities. Skills, strategies, rules, and personal wellness goals are included as appropriate. This course will provide students with an understanding of the fundamental concepts of the physiological functions and training principles associated with the chosen sport.

Course Objectives:

1. Understand training principles used in the sport
2. Demonstrate knowledge of the game in a recreational /competitive play setting
3. Organize an event around the sport
4. Demonstrate concepts of warm up, game conditioning, training plans

Course Outcomes:

1. Learn to play Chess
2. Understanding ofthe fundamental concepts such asrules ofplay, game variations
3. Understanding ofthe governing structure andadministrationofthe sport
4. Understand the event management ofthe sport
5. Apply sport concepts into anactive physical lifestyle

List of Activities:

1. Watch a sport documentary / training video / game history
2. On field coaching and demonstration session
3. Guided practice and play
4. Event management & game officiating
5. Friendly competitions and structured matches

Instructional Plan:

1. Introduction to Chess - History and development
2. Rules of the Game, Play Area & dimensions
3. Fundamental Skills - Chess: Pieces & functions, basic play
4. Chess board moves & terminology
5. Chess Gameplay: Openings, castling, strategies & tactics
6. Preparatory Drills and Fun Games
7. Game Variations & Officiating

Reference:

1. International Chess Federation (FIDE) Handbook

DOSP1031: Football

L	T	P	S	J	C
0	0	0	2	0	2*

This course provides instruction and the opportunity for participation in sports and physical fitness activities. Skills, strategies, rules, and personal wellness goals are included as appropriate. This course will provide students with an understanding of the fundamental concepts of the physiological functions and training principles associated with the chosen sport.

Course Objectives:

1. Understand training principles used in the sport
2. Demonstrate knowledge of the game in a recreational /competitive play setting
3. Organize an event around the sport
4. Demonstrate concepts of warm up, game conditioning, training plans

Course Outcomes:

1. Learn to play Football
2. Understanding ofthe fundamental concepts such asrules ofplay, game variations
3. Understanding ofthe governing structure andadministrationofthe sport
4. Understand the event management ofthe sport
5. Apply sport concepts into anactive physical lifestyle

List of Activities:

1. Watch a sport documentary / training video / game history
2. On field coaching and demonstration session
3. Guided practice and play
4. Event management & game officiating
5. Friendly competitions and structured matches

Instructional Plan:

1. Introduction to Football - History and development
2. Rules of the Game, Play Area & dimensions
3. Fundamental Skills - Kicking, heading, ball control, Keeping
4. Movement, throwins, tackling, defense, scoring, defense
5. Gameplay- Formations, passing, FKs, CKs, PK, tactics
6. Preparatory Drills and Fun Games
7. Game Variations: Small sided games, 7v7, 11v11

Reference:

1. FIFA Laws of the Game

DOSP1041: Volleyball

L	T	P	S	J	C
0	0	0	2	0	2*

This course provides instruction and the opportunity for participation in sports and physical fitness activities. Skills, strategies, rules, and personal wellness goals are included as appropriate. This course will provide students with an understanding of the fundamental concepts of the physiological functions and training principles associated with the chosen sport.

Course Objectives:

1. Understand training principles used in the sport
2. Demonstrate knowledge of the game in a recreational /competitive play setting
3. Organize an event around the sport
4. Demonstrate concepts of warm up, game conditioning, training plans

Course Outcomes:

1. Learn to play Volleyball
2. Understanding ofthe fundamental concepts such asrules ofplay, game variations
3. Understanding ofthe governing structure andadministrationofthe sport
4. Understand the event management ofthe sport
5. Apply sport concepts into anactive physical lifestyle

List of Activities:

1. Watch a sport documentary / training video / game history
2. On field coaching and demonstration session
3. Guided practice and play
4. Event management & game officiating
5. Friendly competitions and structured matches

Instructional Plan:

1. Introduction to Volley - History and development
2. Rules of the Game, Play Area & dimensions
3. Fundamental Skills - Striking, Ball control, Lifting
4. Sports Specific fitness and warmup drills
5. Stances and footwork
6. Preparatory Drills and Fun Games
7. Gameplay: Jumps, strikes, layoffs, attack, defense

Reference:

1. FIVB - Official Volleyball Rules

DOSP1051: Kabaddi

L	T	P	S	J	C
0	0	0	2	0	2*

This course provides instruction and the opportunity for participation in sports and physical fitness activities. Skills, strategies, rules, and personal wellness goals are included as appropriate. This course will provide students with an understanding of the fundamental concepts of the physiological functions and training principles associated with the chosen sport.

Course Objectives:

1. Understand training principles used in the sport
2. Demonstrate knowledge of the game in a recreational /competitive play setting
3. Organize an event around the sport
4. Demonstrate concepts of warm up, game conditioning, training plans

Course Outcomes:

1. Learn to play Kabaddi
2. Understanding ofthe fundamental concepts such asrules ofplay, game variations
3. Understanding ofthe governing structure andadministrationofthe sport
4. Understand the event management ofthe sport
5. Apply sport concepts into anactive physical lifestyle

List of Activities:

1. Watch a sport documentary / training video / game history
2. On field coaching and demonstration session
3. Guided practice and play
4. Event management & game officiating
5. Friendly competitions and structured matches

Instructional Plan:

1. Introduction to Kabaddi - History and development
2. Rules of the Game, Play Area & dimensions
3. Fundamental Skills - Raiding, catching
4. Sports Specific fitness and warmup drills
5. Stances and footwork
6. Preparatory Drills and Fun Games
7. Gameplay: Chain system movement

Reference:

1. Amateur Kabaddi Federation of India (AKFI) - Official Rules
2. Rules of Kabadddi - International Kabaddi Federation

DOSP1091: Basketball

L	T	P	S	J	C
0	0	0	2	0	2*

This course provides instruction and the opportunity for participation in sports and physical fitness activities. Skills, strategies, rules, and personal wellness goals are included as appropriate. This course will provide students with an understanding of the fundamental concepts of the physiological functions and training principles associated with the chosen sport.

Course Objectives:

1. Understand training principles used in the sport
2. Demonstrate knowledge of the game in a recreational /competitive play setting
3. Organize an event around the sport
4. Demonstrate concepts of warm up, game conditioning, training plans

Course Outcomes:

1. Learn to play Basketball
2. Understanding ofthe fundamental concepts such asrules ofplay, game variations
3. Understanding ofthe governing structure andadministrationofthe sport
4. Understand the event management ofthe sport
5. Apply sport concepts into anactive physical lifestyle

List of Activities:

1. Watch a sport documentary / training video / game history
2. On field coaching and demonstration session
3. Guided practice and play
4. Event management & game officiating
5. Friendly competitions and structured matches

Instructional Plan:

1. Introduction to Basketball - History and development
2. Rules of the Game, Play Area & dimensions
3. Fundamental Skills - Passing, Receiving, Dribbling
4. Sports Specific fitness and warmup drills
5. Stances and footwork: Jumps, dribbles, catching, throws
6. Preparatory Drills and Fun Games
7. Gameplay: Shots, throws, movements, attack, defense

Reference:

1. FIBA Basketball Official Rules

DOSP1111: Throwball

L	T	P	S	J	C
0	0	0	2	0	2*

This course provides instruction and the opportunity for participation in sports and physical fitness activities. Skills, strategies, rules, and personal wellness goals are included as appropriate. This course will provide students with an understanding of the fundamental concepts of the physiological functions and training principles associated with the chosen sport.

Course Objectives:

1. Understand training principles used in the sport
2. Demonstrate knowledge of the game in a recreational /competitive play setting
3. Organize an event around the sport
4. Demonstrate concepts of warm up, game conditioning, training plans

Course Outcomes:

1. Learn to play Throwball
2. Understanding ofthe fundamental concepts such asrules ofplay, game variations
3. Understanding ofthe governing structure andadministrationofthe sport
4. Understand the event management ofthe sport
5. Apply sport concepts into anactive physical lifestyle

List of Activities:

1. Watch a sport documentary / training video / game history
2. On field coaching and demonstration session
3. Guided practice and play
4. Event management & game officiating
5. Friendly competitions and structured matches

Instructional Plan:

1. Introduction to Throwball - History and development
2. Rules of the Game, Play Area & dimensions
3. Fundamental Skills - Throwing, Receiving
4. Sports Specific fitness and warmup drills
5. Stances and footwork
6. Preparatory Drills and Fun Games
7. Gameplay: Shots, throws, movements, control

Reference:

1. World Throwball Federation - Rules of the Game

DOSL1001:ClubActivity– Participant

L	T	P	S	J	C
0	0	0	2	0	2*

This course recognizes student participation in multiple activities organized by various studentorganizations that pursue specific co-curricular and extra-curricular interests. These activitiesallowstudentsto engageinandidentifyand pursuetheirpersonalinterestsand hobbies.

CourseObjectives

- Createopportunitiesfor studentstoparticipateinavarietyofnon-academicexperiences
- Interactwithandlearnfrompeersinasettingwithoutanexternalperformancepressure
- Allowexplorationofinterestingactivitiesandreflectionabouttheseexperiences
- Learntomanagetimeeffectively

ListofStudentClubActivities

1. Music(vocals,instruments,technical,recording,mixing,production,management)
2. Dance(Indianclassical,western,jazz, latin,contemporary,folk,production,eventmanagement)
3. Theatre(classical,experimental,one-act,street,production,direction,casting,etc.)
4. Arts(finearts, painting,calligraphy,sketching,caricaturing,etc)
5. Craft (origami,modelmaking,sculpture,pottery,etc)
6. Cooking(home-style,baking,confectionery,Indian,intercontinental,etc.)
7. Graffiti(street,mural,collage,multimedia, etc)
8. Workshops,quizzes,debates,elocution,etc
9. Filmmaking(adventure,drama,filmappreciation,documentary,etc)
10. Photography(conventional,immersive(360),landscape,portrait,technical,editing,etc.)
11. College Fests
12. Designing(graphicdesign,landscape,interior,etc)
13. Competitivecoding
14. Recreationalsportsactivities
15. Otherclubactivitiesorganizedbystudentclubs

ListofActivities

1. Participationinvariousclubbasedactivities
2. Weeklyreflectionpaper
3. Portfolio(onsocialmediausinganinstagramaccount)
4. Twolearningpapers(oneper semester)

TextBooks

1. Smallmove:bigChange(Caroline Arnold)
2. Howto WinatCollege: SurprisingSecretsforSuccessfromtheCountry'sTop Students(CalNewport)

References

1. Makingthemost ofcollege:Studentsspeaktheir minds(author-RichardLight)
2. FailingForward:TurningMistakesintoSteppingStonesforSuccess(JohnCMaxwell)
3. TheLastLecture(RandyPausch)
4. Leanin(SherylSandberg)
5. Youtube- Introductiontovariousclubactivities

CourseOutcomes

Uponsuccessfulcompletionofthecourse,studentwillbe able to

- Identifypersonalinterestareas
- Learnfromdiverseperspectivesandexperiences
- Gainexposuretovariousactivitiesandopportunities forextra-curicularactivities
- Learntomanagetimeeffectively
- gainconfidence

DOSL1011: ClubActivity –MemberoftheClub

L	T	P	S	J	C
0	0	0	2	0	2*

This course encourages and acknowledges studentmembers' work in organizing events andactivities organized by various student organizations that pursue specific co-curricular and extra-curricularinterests.Theseactivitiesallowstudentstoactivelylearnfromtheprocessofconceptualizingandorganizingsuchactivitiesas partofateam.

Course Objectives

- Createopportunitiesfor studentstolearnfromorganizing clubactivities
- Learnteamwork,leadership, planningandmanagementofeventsandactivities
- Learntoappreciatemultipleperspectives,cultures,and individualcapabilities
- Learntomanagetimeeffectively

ListofStudentClub Activities

1. Music(vocals,instruments,technical,recording,mixing,production,management)
2. Dance(Indianclassical,western,jazz, latin,contemporary,folk,production,eventmanagement)
3. Theatre(classical,experimental,one-act,street,production,direction,casting,etc.)
4. Arts(finearts, painting,calligraphy,sketching,caricaturing,etc)
5. Craft (origami,modelmaking,sculpture,pottery,etc)
6. Cooking(home-style,baking,confectionery,Indian,intercontinental,etc.)
7. Graffiti(street,mural,collage,multimedia, etc)
8. Workshops,quizzes,debates,elocution,etc
9. Filmmaking(adventure,drama,filmappreciation,documentary,etc)
10. Photography(conventional,immersive(360),landscape,portrait,technical,editing,etc.)
11. College Fests
12. Designing(graphicdesign,landscape,interior,etc)
13. Competitivecoding
14. Recreationalsportsactivities
15. Otherclubactivitiesorganizedbystudentclubs

ListofActivities

1. Beamemberofaclubandorganizeactivitiesin thatparticularinterestarea
2. Learnfromdiverseperspectivesandexperiences
3. Learnto designand executeextra-curicular activities
4. Develop managementskillsthroughhandsonexperience
5. Exploredifferentmanagerialrolesanddevelopcompetencies

Text Books

1. Smallmove:bigChange(Caroline Arnold)
2. How to Win at College: Surprising Secrets for Success from the Country's Top Students(CalNewport)

References

1. Makingthemost ofcollege:Studentsspeaktheir minds(author-RichardLight)
2. FailingForward:TurningMistakesintoSteppingStonesforSuccess(JohnCMaxwell)
3. TheLastLecture(RandyPausch)
4. Leanin(SherylSandberg)
5. Youtube- Introductiontovariousclubactivities

CourseOutcomes

Uponsuccessfulcompletionofthecourse,studentwillbe able to

- Beamemberofaclubandorganizeactivities inthatparticularinterestarea
- Learnfromdiverseperspectivesandexperiences
- Learnto designand executeextra-curicular activities
- Develop managementskillsthroughhandsonexperience
- Exploredifferentmanagerialrolesanddevelopcompetencies

DOSL1021: Club Activity–Leader of the Club

L	T	P	S	J	C
0	0	0	2	0	2*

Thiscourseencouragesandrecognizesstudentmembers'workinleadingthestudentorganizationsthroughvariousleadershiproles.Asleaderstheyworknotjusttoorganizeeventsandactivitiesinspecific co-curricular and extra-curricular interests, but also lead the teams that form the coremembers of the clubs.These activities allowstudents tolearn andpracticeleadershipandmanagementskills throughrealworldexperience.

Course Objectives

- Createopportunitiesfor studentstolearnfromorganizing clubactivities
- Learnteamwork,leadership, planningandmanagementofeventsandactivities
- Learntoappreciatemultipleperspectives, cultures,andindividualcapabilities
- Learntomanagetimeeffectively

ListofStudentClub Activities

1. Music(vocals,instruments,technical,recording,mixing,production,management)
2. Dance(Indianclassical,western,jazz, latin,contemporary,folk,production,eventmanagement)
3. Theatre(classical,experimental,one-act,street,production,direction,casting,etc.)
4. Arts(finearts, painting,calligraphy,sketching,caricaturing,etc)
5. Craft (origami,modelmaking,sculpture,pottery,etc)
6. Cooking(home-style,baking,confectionery,Indian,intercontinental,etc.)
7. Graffiti(street,mural,collage,multimedia,etc)
8. Workshops,quizzes,debates,elocution,etc
9. Filmmaking(adventure,drama,filmappreciation,documentary,etc)
10. Photography(conventional,immersive(360),landscape,portrait,technical,editing,etc.)
11. College Fests
12. Designing(graphicdesign,landscape,interior,etc)
13. Competitivecoding
14. Recreationalsportsactivities
15. Otherclubactivitiesorganizedbystudentclubs

ListofActivities

1. Betheleader oftheclubandimplementthecharter,visionandmissionoftheclub
2. Learnfromdiverseperspectivesandexperiences
3. Learntoleadtheteam,designandexecuteextra-curicular activities
4. Develop managementskillsthroughhandsonexperience
5. Exploredifferentmanagerialrolesanddevelopcompetencies

Text Books

1. Smallmove:bigChange(CarolineArnold)
2. Howto WinatCollege: SurprisingSecretsforSuccessfromtheCountry'sTop Students(CalNewport)

References

1. Makingthemost ofcollege:Studentsspeaktheir minds(author-RichardLight)
2. FailingForward:TurningMistakesintoSteppingStonesforSuccess(JohnCMaxwell)
3. TheLastLecture(RandyPausch)
4. Leanin(SherylSandberg)
5. Youtube- Introductiontovariousclubactivities

CourseOutcomes

Uponsuccessfulcompletionofthecourse,studentwillbe able to

- Betheleader oftheclubandimplementthecharter,visionandmissionoftheclub
- Learnfromdiverseperspectivesandexperiences
- Learntoleadtheteam,designandexecuteextra-curricularactivities
- Developmanagementskillsthroughhandsonexperience
- Exploredifferentmanagerialrolesanddevelopcompetencies

DOSL1031: Club Activity–Competitor

L	T	P	S	J	C
0	0	0	2	0	2*

Thiscourseencouragesandrecognizesstudentmembers'workinleadingthestudentorganizationsthroughvariousleadershiproles.Asleaderstheyworknotjusttoorganizeeventsandactivitiesinspecific co-curricular and extra-curricular interests, but also lead the teams that form the coremembers of theclubs.Theseactivities allowstudents tolearn andpracticeleadershipandmanagementskills throughrealworldexperience.

Course Objectives

- Createopportunitiesfor studentstolearnfromorganizingclubactivities
- Learnteamwork, leadership, planningandmanagementofeventsandactivities
- Learntoappreciatemultipleperspectives,cultures,and individualcapabilities
- Learntomanagetimeeffectively

ListofStudentClub Activities

1. Music(vocals,instruments,technical,recording,mixing,production,management)
2. Dance(Indianclassical,western,jazz, latin,contemporary,folk,production,eventmanagement)
3. Theatre(classical,experimental,one-act,street,production,direction,casting,etc.)
4. Arts(finearts, painting,calligraphy,sketching,caricaturing,etc)
5. Craft (origami,modelmaking,sculpture,pottery,etc)
6. Cooking(home-style,baking,confectionery,Indian,intercontinental,etc.)
7. Graffiti(street,mural,collage,multimedia,etc)
8. Workshops,quizzes,debates,elocution,etc
9. Filmmaking(adventure,drama,filmappreciation,documentary,etc)
10. Photography(conventional,immersive(360),landscape,portrait,technical,editing,etc.)
11. College Fests
12. Designing(graphicdesign,landscape,interior,etc)
13. Competitivecoding
14. Recreationalsportsactivities
15. Otherclubactivitiesorganizedbystudentclubs

ListofActivities

1. Betheleader oftheclubandimplementthecharter,visionandmissionoftheclub
2. Learnfromdiverseperspectivesandexperiences
3. Learntoleadtheteam,designandexecuteextra-curicular activities
4. Develop managementskillsthroughhandsonexperience
5. Exploredifferentmanagerialrolesanddevelopcompetencies

Text Books

1. Smallmove:bigChange(Caroline Arnold)
2. Howto WinatCollege: SurprisingSecretsforSuccessfromtheCountry'sTop Students(CalNewport)

References

1. Makingthe mostofcollege:Studentsspeaktheir minds(author-RichardLight)
2. FailingForward:TurningMistakesintoSteppingStonesforSuccess(JohnCMaxwell)
3. TheLastLecture(RandyPausch)
4. Leanin(SherylSandberg)
5. Youtube- Introductiontovariousclubactivities

CourseOutcomes

Uponsuccessfulcompletionofthecourse,studentwillbe able to

- Betheleader oftheclubandimplementthecharter,visionandmissionoftheclub
- Learnfromdiverse perspectivesandexperiences
- Learntoleadtheteam,designandexecuteextra-curricular activities
- Develop managementskillsthroughhandsonexperience
- Exploredifferentmanagerialrolesanddevelopcompetencies

POLS1001: Indian Constitution and History

L	T	P	S	J	C
2	0	0	0	0	2*

Course Description:
This course analyzes the basic structure and operative dimensions of the Indian Constitution. It explores various aspects of the Indian political and legal system from a historical perspective highlighting the various events that led to the making of the Indian Constitution. The course also deals with various challenges faced by the constitution and its coping mechanisms. Broadly, the students would understand and explain the working of different institutions and political debates ensuing from the operation of the Indian constitution in action.

Course Objectives:

1. To introduce constitutional history of India.
2. To explain the process of making Indian constitution
3. To analyze Fundamental of Rights, Duties and other principles in constitution
4. To create familiarity with political developments which shaped the constitution.

Course Outcomes:

On the successful completion of the course students would be able to:

1. Demonstrate an understanding of the Constitution of India and how constitutional governance is carried out in India
2. Interpret knowledge of the Fundamental Rights and Duties of the Citizens as well as the Obligation of the state towards its citizens
3. Correlate familiarity with key political developments that have shaped the Constitution and amended it from time to time.
4. Equip themselves to take up other courses in law after having done a foundation course on Indian Constitution

Unit I: India as a Nation **6 hrs**

Khilani, S. (2004). *Introduction, The Idea of India*, Chapter 1. New Delhi: Penguin Books, pp. 1-15.

Rowat, D. (1950). 'India: The Making of a Nation', *International Journal, 5*(2), 95-108. doi:10.2307/40194264

Brass, P. (2018). 'Continuities and Discontinuities between pre- and post-Independence India', Chapter 1. *The Politics of Idea since independence*, New Delhi: Cambridge University Press. pp. 1-30.

Module Learning Outcomes

1. Understand ideas of India
2. Explain the story behind making constitution and its future.
3. Articulate the differences between pre and post-colonial governments.

Unit 2: Understanding the Constitution **6 hrs**

Mehta, U.S. (2011). 'Constitutionalism' in *The Oxford Companion to Politics in India*, (ed) by Nirja Gopal Jayal, and Pratap Bhanu Mehta, New Delhi: Oxford University Press. pp. 15-27.
Austin, G. (2016), 'The Constituent Assembly: Microcosm in Action' in *The Indian Constitution: Cornerstone of a Nation,* New Delhi: Oxford University Press, pp. 1-25.
Beteille, Andre (2008): "Constitutional Morality," *Economic and Political Weekly*, Vol 43, Issue No 40
Prahladan, Vivek (2012): "Emergence of the Indian Constitution," *Economic and Political Weekly*, Vol 47, Issue No 07.

Module Learning Outcomes

Understand the concept of constitutionalism. Demonstrate strength or weakness of constitutional morality in India
Evaluate constituent assembly debates in framing Indian Constitution.

Unit 3: The Preamble, Fundamental Rights and Directive Principles of State Policy 6 hrs

Bhakshi, P.M. (2011). 'Preamble' in *The Constitution of India,* New Delhi: Universal Law. Pp. 1-5.
Laxmikanth, M. (2017). 'Chapter IV: Preamble of the Constitution' in *Indian Polity*, Chennai: McGraw Hills.
Kumar, Virendra (2007): "Basic Structure of The Indian Constitution: Doctrine of Constitutionally Controlled Governance [From Kesavananda Bharati to I.R. Coelho]" *Journal of the Indian Law Institute*, Vol 49, No 3, pp 365-398.
Austin, G (2016), ' ' in *The Indian Constitution: Cornerstone of a Nation*, New Delhi: Oxford University Press, pp.63-105.
Reddy, S (1980). Fundamental Ness of Fundamental Rights and Directive Principles in the Indian Constitution. *Journal of the Indian Law Institute,* 22(3), pp. 399-407.
Bhatia, Gautam (2017): "The Supreme Court's Right to Privacy Judgement," *Economic and Political Weekly,* Vol 52, Issue No 44

Module Learning Outcomes

1. Explain the relationship between 'Preamble' and 'The constitution'.
2. Interpret the key concepts of preamble
3. Analyzes the dynamic nature of Indian constitution
4. Understanding Fundamental Rights
5. Evaluate Directive Principles of State Policy
6. Interpret case studies on Fundamental Rights.

Unit 4: Citizenship 6 hrs

Jayal, N.G. (2019). 'Reconfiguring citizenship in contemporary India' in *South Asia Journal of South Asian Studies*, pp.33-58.
Roy, Anupama. (2010). 'Chapter I: Enframing the citizen in contemporary times' in *Mapping Citizenship in India,* New Delhi: Oxford University Press.
Das, Veena (2010): "State, Citizenship and the Urban Poor," *Citizenship Studies,* Vol 15, pp 319-333.
Valerian Rodrigues

Module Learning Outcomes

1. Explain different dimensions of citizenship in Indian context
2. Evaluate the basis of citizenship

3. Compare ‘claim’ and ‘status’of citizenship

Unit 5: Separation and Distribution of Powers 6 hrs

Pal, Ruma. (2016). ‘Separation of Powers’ in *The Oxford Handbook of the Indian Constitution*, (ed) by Sujit Choudhry, Madhav Khosla, and Pratap Bhanu Mehta, Delhi: Oxford University Press.

Bakshi, P. (1956). ‘Comparative Law: Separation of Powers in India’. *American Bar Association Journal, 42*(6), 553-595.

Rao, P. (2005). ‘Separation of Powers in a Democracy: The Indian Experience’. *Peace Research, 37*(1), 113-122.

Kumar, Ashwani (2019): “Constitutional Rights, Judicial Review and Parliamentary Democracy,” *Economic and Political Weekly*, Vol 51, Issue 15

Tillin, Louise. (2015). ‘Introduction’ in *Indian Federalism*. New Delhi: Oxford University Press. pp. 1-30.

Chakrabarty, Bidyut and Rajendra Kumar Pandey. (2008). *Federalism’ in Indian Government and Politics,* New Delhi: Sage Publications. pp. 35-53.

Arora, B. and Kailash, K. K. (2018). ‘Beyond Quasi Federalism: Change and Continuity in Indian Federalism’, in *Studies in Indian Politics*, pp. 1-7.

Agrawal, Pankhuri (2020): “COVID-19 and dwindling Indian Federalism,” *Economic and Political Weekly,* Vol 55, Issue No 26

Module Learning Outcomes

1. Explain the importance of separation of powers in a democracy
2. Understand the relation between three organs of the government
3. Evaluate the system of ‘checks and balances’
4. Understand the difference between unitary and federal political systems
5. Critically analyze the Indian model of Federalism
6. Evaluate the distribution of responsibilities between union and state governments.

Recommended Readings:

De, Rohit. (2018). *A People’s Constitution – The Everyday Life of Law in the Indian Republic*, USA: Princeton University Press.

Granville Austin, *The Indian Constitution: Cornerstone of a Nation*, Oxford University Press, Oxford, 1966.

Lahoti, R.C. (2004). *Preamble: The Spirit and Backbone of the Constitution of India*. Delhi: Eastern Book Company.

Rajeev Bhargava (ed), *Ethics and Politics of the Indian Constitution*, Oxford University Press, New Delhi, 2008.

Subhash C. Kashyap, *Our Constitution*, National Book Trust, New Delhi, 2011.

Tillin, Louise. (2015). *Indian Federalism*. New Delhi: Oxford University Press.

Zoya Hassan, E. Sridharan and R. Sudarshan (eds), *India’s Living Constitution: Ideas, Practices, Controversies*, Permanent Black, New Delhi, 2002.

PHPY1001: Gandhi for the 21st Century

L	T	P	S	J	C
2	0	0	0	0	2*

Course Description

This course provides the students with basic knowledge on Gandhi's early life, transformations in South Africa and his entry into India's national movement. While going through the social-political, economic and educational philosophies of Gandhi, the course analyses how his ideologies are relevant even in the 21st century.

Course Objectives

The objectives of the course are;

1. To provide the students with the basic knowledge on Gandhi's life and his philosophies
2. To understand the early influences and transformations in Gandhi
3. To analyse the role of Gandhi in India's national movement
4. To apply Gandhian Ethics while analysing the contemporary social/political issues
5. To appreciate the conflict resolution techniques put forward by Gandhi and its significance in the current scenario.

Module I :MK Gandhi: Childhood and Education

M K Gandhi, Formative Years (1869-1893): Early childhood - study in England - Indian influences, early Western influences.

Module II: From Mohan to Mahatma-South African Experiences

Gandhi in South Africa (1893-1914): South African Experiences - civil right movements in South Africa - invention of Satyagraha - Phoenix settlement- Tolstoy Farm - experiments in Sarvodaya, education, and sustainable livelihood.

Module III: Gandhi and Indian National Movement

Gandhi and Indian National Movement (1915-1947): Introduction of Satyagraha in Indian soil - non-cooperation movement - call for women's participation - social boycott - Quit-India movement - fighting against un-touchability - Partition of India- independence.

Module IV: Gandhi and Sustainable Development

Gandhian Constructive Programs-Eleven Vows-Sarvodaya-Seven Social Sins-Gandhian Economics and Sustainable Development

Module V: Gandhi and Contemporary Issues

Conflict Resolution Techniques of Gandhi-Ecological Challenges and Gandhian solutions-Gandhian Ethics-An Analysis

Learning Outcomes

1. To understand the life of Gandhi
2. To understand the role of Gandhi in Indian national movement
3. To analyse the origin and significance of Satyagraha
4. To understand the eleven vows of Gandhi which he followed through-out his life.
5. To examine the significance of constructive programs today

Course Outcomes

After the successful completion of the course the students will be able to;
1. Understand the life of Gandhi
2. Appreciate the role of Gandhian non-violence and Satyagraha in India's freedom struggle.
3. Critically examine the philosophy of Gandhi on Education, Sarvodaya, and Satyagraha
4. Analyse the contemporary significance of Gandhian constructive programmes and eleven vows
5. Examine the possible solutions for some of the contemporary challenges like environmental issues, moral degradation and ethical dilemmas.

References

1. Gandhi, M K. (1941). *Constructive Programme*. Ahmadabad: Navjivan Publishing House
2. Gandhi, M. K. (1948). *The Story of My Experiments with Truth*. Ahmadabad: Navjivan Publishing House
3. Gandhi, M K. (1968). *Satyagraha in South Africa*. Ahmadabad: Navjivan Publishing House.
4. Khoshoo, T N (1995). *Mahatma Gandhi: An Apostle of Applied Human Ecology*. New Delhi:TERI
5. Kripalani, J.B. (1970). *Gandhi: His Life and Thought*. New Delhi: Publications Division.
6. Narayan, Rajdeva (2011). *Ecological Perceptions in Gandhism and Marxism*. Muzaffarpur: NISLS
7. Pandey, J. (1998). *Gandhi and 21st Century*. New Delhi: Concept.
8. Weber, Thomas (2007).Gandhi as Disciple and Mentor. New Delhi: CUP

DOSL1041:CommunityServices -Volunteer

L	T	P	S	J	C
0	0	0	0	2	2*

Thiscourserecognizesstudentparticipationin Communityserviceactivitiesorganizedbyvariousstudent organizations and other Government and non-government organizations that exist forprovidingservicetocommunities.Theseactivitiesallowstudentstodevelopempathy,citizenship behaviorandcommunityvalues.

Course Objectives

- Tohelpstudentsdevelopempathyandcitizenshipbehavior
- Enablestudentstodevelopanaltruisticattitudeandcommunitydevelopmentsensibility
- Allowexplorationofcommunityserviceactivitiesandreflectabouttheseexperiences
- Learntoworkinsmallandlargeteams forachievingcommunityobjectives

ListofCommunityServiceActivities

1. CommunityHealthServices
2. SwachhBharatAbhiyanandother Cleanlinessdrives
3. TreePlantationandsimilarenvironmentalconservationinitiatives
4. Rainwater harvestingawarenessandimplementation
5. FundraisingandvisitstoOrphanages,Old-agehomes, etc.
6. Healthanddiseaseawarenessprograms
7. WorkingwithNGOs
8. Disastermitigationandmanagementtrainingandreliefwork
9. RuralUpliftmentprojects
10. Campusawarenessandactionprojects(cleanliness,anti-ragging, blood donation,etc)
11. Communityinvestigationsandsurveysfordevelopmentresearch
12. Educationalsupportforunderprivileged(remedialclasses,coaching,training,etc)
13. Servicecamps
14. Advocacyand informationliteracyinitiatives
15. Otheractivitiesserving localcommunities

ListofActivities

1. Participationinvariouscommunityserviceactivities
2. Weeklyreflectionpaper
3. Portfolio(onsocialmediausinganinstagramaccount)
4. Twolearningpapers(onepersemester)

Text Books

1. Soulofacitizen:livingwithconviction inChallengingtimes(author: PaulRogatLoeb)
2. CommunityServicesintervention:VeraLloyd

References

1. Apathappears:Transforminglives,creatingopportunities(NicholasKristofandSherylWuDunn)
2. ThestoryofMyExperimentswithTruth(author:M.K.Gandhi)

CourseOutcomes

- ExperienceofvolunteeringinavarietyofCommunityserviceactivities
- Gainingempathyforlesser privilegedsectionsofsocietybyexperience
- Understandingtheprocessofgeneratingcommunityawareness
- UnderstandingDisastermanagementandreliefthroughtrainingandexperience
- Developingenvironmentalandsustainabilityawareness

DOSL1051:CommunityServices -Mobilizer

L	T	P	S	J	C
0	0	0	0	2	2*

Thiscourserecognizesstudent leadership inmobilizingcommunityserviceactivitiesasmembersofvariousstudentorganizationsorotherGovernmentandnon-governmentorganizationsthatexistfor providing service to communities. These activities allow students to develop leadership,managementskills,empathy,citizenshipbehaviorandcommunityvalues.

Course Objectives

- Tohelpstudentsunderstandleadershipinacommunityenvironment
- Enablestudentstodevelopanaltruisticattitudeandcommunitydevelopmentsensibility
- Allowdeepunderstandingofcommunityservicethroughpracticalexperience
- Learntoleadsmallandlargeteamsfor achievingcommunityobjectives

ListofCommunityServiceActivities

1. CommunityHealthServices
2. SwachhBharatAbhiyanandother Cleanlinessdrives
3. TreePlantationandsimilarenvironmentalconservationinitiatives
4. Rainwater harvestingawarenessandimplementation
5. FundraisingandvisitstoOrphanages,Old-agehomes, etc.
6. Healthanddiseaseawarenessprograms
7. WorkingwithNGOs
8. Disastermitigationandmanagementtrainingandreliefwork
9. RuralUpliftmentprojects
10. Campusawarenessandactionprojects(cleanliness, anti-ragging, blooddonation,etc)
11. Communityinvestigationsandsurveysfordevelopmentresearch
12. Educationalsupportforunderprivileged(remedialclasses,coaching,training,etc)
13. Servicecamps
14. Advocacyandinformationliteracyinitiatives
15. Otheractivitiesserving localcommunities

ListofActivities

1. Organizingandleadingteamsinvariouscommunityserviceactivities
2. Fortnightlyreflectionpaper
3. Portfolio(onsocialmediausing aninstagramaccount)
4. Twolearningpapers(oneper semester)

Text Books

1. Soulofacitizen:livingwithconviction inChallengingtimes(author: PaulRogatLoeb)
2. CommunityServicesintervention:VeraLloyd

References

1. Apathappears:Transforminglives, creatingopportunities(NicholasKristofandSherylWuDunn)
2. ThestoryofMyExperimentswithTruth(author:M.K.Gandhi)
3. ListofstudentrunandandotherGovernmentandnon-governmentcommunityserviceorganizations organizations

CourseOutcomes

- ExperienceofmobilizingandexecutingCommunityserviceactivities
- Providingopportunitiesforcommunityservicevolunteeringforotherfellowstudents
- Understandingtheprocessofmobilizingcash, kindandvolunteersupport
- Buildingleadershipandmanagementskills
- Buildingempathyandcitizenshipbehavior

ENVS1001: Environmental Studies

L	T	P	S	J	C
3	0	0	0	0	3*

The course enables the students to adapt eco-centric thinking and actions rather than human-centric thinking on natural resources, their utilization and conservation. The course also focuses on the importance of ecosystems, biodiversity and their degradation led to pollution. This course helps in finding solutions through application of control measures to combat pollution and legal measures to achieve sustainable development.

Course Objectives

1. To impart knowledge on natural resources and its associated problems.
2. To familiarize learners about ecosystem, biodiversity, and their conservation.
3. To introduce learners about environment pollution.
4. To acquaint learners on different social issues such as conservation of water, green building concept.
5. To make learners understand about the present population scenario, its impacts and role of informational technology on environment and human health.
6. To make learners understand about the importance of field visit.

Course Outcomes

1. To impart knowledge on natural resources and its associated problems.
2. To familiarize learners about ecosystem, biodiversity, and their conservation.
3. To introduce learners about environment pollution.
4. To acquaint learners on different social issues such as conservation of water, green building concept.
5. To make learners understand about the present population scenario, its impacts and role of informational technology on environment and human health.

UNIT–I	**Multidisciplinarynatureofenvironmentalstudies&NaturalResources:**	Noof Hours: 12
Multidisciplinary nature of environmental studies Definition, scope and importance. Need for publicawareness.Naturalresourcesandassociatedproblems. UsesandoverexploitationofForestresources,Waterresources, Mineral resources, Food resources, Energy resources, Land resources. Role of an individual inconservationofnaturalresources.Equitableuseofresources forsustainablelifestyles. Activity: 1. Plantingtreesaplings 2. Identificationofwaterleakageinhouseandinstitute-Rectify orreport 3. Observinganyonedayofaweekas Car/bike/vehiclefreeday.		
LearningOutcomes:		
Aftercompletionofthisunit,thestudentwillbeableto		
●	Listdifferentnaturalresources andtheiruses.	L1
●	Relatehowtheover-exploitationofnaturalresourcesimpacthumanlife	L1
●	Findtheroleofanindividualintheconservation ofnaturalresources.	L1
●	Recallthedemandofpotablewaterinacommunity.	L1
●	Explaintheequitableuseofnaturalresourcesforsustainablelifestyles.	L2
Pedagogytools: Blendedlearning,Caselet,videolectures,self-reading		
UNIT–II	**Ecosystemand biodiversity**	NoofHours: 12

Ecosystem: Structure components of ecosystem: Biotic and Abiotic components. Functional components ofan ecosystem: Food chains, Food webs, Ecological pyramids, Energy flow in the ecosystem (10% law),Ecologicalsuccession.Biogeochemicalcycle:(Nitrogen,carbon, Phosphoruscycle).

Biodiversity: Definition, Biogeographical classification of India, Values of biodiversity: consumptive use,productiveuse,social,ethical,aestheticandoptionalvalues.Hot-spotsofbiodiversity.Threatstobiodiversity:habitatloss,poaching,man wildlifeconflicts.Conservationofbiodiversity:In–situandEx-situ

Activity"

1. VisittoZoological Park-Notingdifferentecosystem
2. Biodiversityregister-Floraandfaunainthecampus

LearningOutcomes:

Aftercompletionofthisunit,thestudentwillbeableto

●	Demonstratehowecosystemfunctions.
●	Summarizethestructureandfunction ofterrestrialandaquaticecosystems.
●	Explain thevalues andthreatstobiodiversity.
●	Identifytheimportanceofconservationofbiodiversity.

Pedagogytools: Blendedlearning,Caselet,videolectures,self-reading

UNIT–III	**EnvironmentalPollution**	NoofHours: 12

Definition Causes, effects, and control measures of: -Air pollution. Water pollution. Soil pollution. Marinepollution. Noise pollution. Nuclear hazards. Solid waste Management: Causes, effects, and control measures.Roleofanindividualinpreventionofpollution.Pollutioncasestudies.

Activity

1. Visittotreatmentplantanddocumentation.
2. Documentation ofsegregationofsolidwaste-Dryand Wet

LearningOutcomes:

Aftercompletionofthisunit,thestudentwillbeableto

●	Identifycauses,effects,andcontrolmeasuresofpollution(air,water&soil).	L3
●	Choosedifferenttypes ofpollutants.	L3
●	Experimentwith thepollutionrelated casestudies.	L3
●	Solvesolidwasteissuesbutappropriatemanagementtechniques.	L3
●	Analysetheroleofanindividualinprevention ofpollution.	L4

Pedagogytools: Blendedlearning,Caselet,videolectures,self-reading

UNIT–IV	**Social IssuesandtheEnvironment**	NoofHours: 10

From Unsustainable to Sustainable development Urban problems related to energy. Water conservation,rainwater harvesting, watershed management. Resettlement and rehabilitation of people; its problems andconcernsrelatedtomining,dams,CaseStudies.Environmentalethics:Issues andpossiblesolutions.Green buildingconcept,Roleofremotesensingand GISin groundwaterexploration.

Climatechange,globalwarming,acidrain,ozonelayerdepletion,nuclearaccidentsandholocaust.CaseStudies.Waste landreclamation.

Activity:

1. Observingzerohouratindividual level-documentation.
2. Ecofriendlyidols.
3. Rainwaterharvesting-creating storagepitsin nearbyarea.

LearningOutcomes:

Aftercompletionofthisunit,thestudentwillbeableto

●	Examinedifferentwater conservationmethods.	L4
●	SurveyremotesensingandGISmethods inexplorationofground water.	L4
●	Functionofgreenbuildingconcept.	L4
●	Discovertheconsequencesofglobalwarming,acidrainsandozonelayerdepletion.	L4

●	Improve wastelandreclamation.	L5
Pedagogytools: Blendedlearning,Caselet,videolectures,self-reading		
UNIT–V	**HumanPopulationandthe EnvironmentandEnvironmentProtection ActandFieldwork**	NoofHours: 12
Populationgrowth,variationamongnations.FamilyWelfareprogramme.Environmentandhumanhealth.HIV/AIDS ,Humanrights.ValueEducation.WomenandChildWelfare.RoleofInformationTechnologyin Environmentandhumanhealth.EnvironmentLegislation.Air(PreventionandControlofPollution)Act.Water		

(PreventionandControlofPollution)Act.WildlifeProtectionAct.ForestConservationAct.EnvironmentalProtection Act,Issuesinvolvedinenforcementofenvironmentallegislation.Publicawareness. Activity: 1. Visittoalocalpollutedsite-industry/agriculture 2. Identifyingdiseasesduetoinappropriateenvironmentalconditions
LearningOutcomes:
Aftercompletionofthisunit,thestudentwillbeableto
● Predictpopulation growth andvariation amongnations. L5
● Adaptvalueeducation. L5
● Discusswomenandchildwelfare. L5
● Theorizedifferentenvironmentallegislationactsandissuesinvolved in enforcementof legislation. L5
● Justifytheroleofinformationtechnologyinenvironmentandhumanhealth. L6
Pedagogytools: Blendedlearning,Caselet,videolectures,self-reading
TextBook(s)
5. ErachBharucha.Textbookofenvironmentalstudiesforundergraduatescourses-UniversitiesPress, IndiaPrivateLimited. 2019.
6. KaushikAandKaushikC.P.PerspectivesinEnvironmentalStudies.NewAgeInternational PublishersEdition-VI. 2018.
7. DaveDKatewaS.S.TextbookofEnvironmentalStudies,2nd Edition.CengageLearningIndia.2012.
Additional Reading
1. BennyJoseph.TextbookofEnvironmentalStudies3rd edition,McGrawHillPublishingcompany limited.2017.
ReferenceBook(s):
3. McKinneyM.L.,SchochR.M.,YonavjakL.MincyG.EnvironmentalScience:SystemsandSolutions.Jone sandBartlettPublishers.6th Edition. 2017. 4. BotkinD.B.Environmental Science:EarthasaLivingPlanet.JohnWileyandSons.5th edition.2005.
Journal(s):
1. https://www.tandfonline.com/loi/genv20 2. https://library.lclark.edu/envs/corejournals
Website(s):
https://www.ugc.ac.in/oldpdf/modelcurriculum/env.pdf FromClimateSciencetoAction|Coursera

	ProgrammeObjectives(POs)												PSO's		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	2												2		
CO2		2				1							2		
CO3			1						1					1	
CO4				2							2				1
CO5	1													1	
CO6					2							1			1

MFST1001: Health & Wellbeing

L	T	P	S	J	C
0	0	2	0	0	1*

UNIT-I

Understand the relationship between Food and Nutrition and how food composition affects nutritional characteristics. Knowledge about regulatory principles in determining diets and recommended daily allowances. Understand how to create personalised diet/nutrition plans.

UNIT-II

Understand how exercise, activity and sports helps in developing good health. Experiential exposure to the role of proper, specific nutritional interventions along with structured activities on developing proper physical health. Practical exercises and assignments in sports and exercise regimes.

UNIT-III

Introduction to emotional wellbeing and mindfulness. Teaching of mindfulness practices to reduce stress, increase relaxation and improve mental wellbeing.

UNIT-IV

Introduction to Yoga theory and how Yoga helps in maintaining balance in the body. Practice of Yoga and meditation to improve overall emotional and physical balance. Practical yoga exercises and meditation techniques

CLAD2001: Preparation for Campus Placement-1
(Soft Skills 5A)

L	T	P	S	J	C
0	0	2	0	0	1

Course Description:
The course addresses all relevant areas related to campus placements and readies them to ace their upcoming/ ongoing recruitment drives. Specifically, it focuses on students' career preparedness, interview skills, test preparedness, etc.

Course Objectives:
Prepare the students for their upcoming/ ongoing campus recruitment drives.

1. Career Preparedness: Resume & Cover Letter Writing, Interview Skills: Elevator Pitch, Making the First Impression, Being Other-Oriented, Being Positive and Curious, communicating with Confidence and Poise, Frequently Asked Questions & How to Answer Them, Pitfalls to Avoid, Etc. Etiquette: Hygiene, Courtesy, Culture differences, Workplace, use of cell phone, Profanity, Slang, Protocol.

2. Verbal Ability: Practising Reading Comprehension, Error Detection, Sentence Completion, MCQs, FIBs, Para jumbles, Cloze Test, Critical Reasoning.

3. Quantitative Aptitude: Number Systems, Algebra, Geometry, Data Handling, Data Sufficiency, Word Problems

4. Reasoning: Logical and Verbal Reasoning

Course Outcomes:
1. Write a power resume and covering letter
2. Answer interview questions with confidence and poise
3. Exhibit appropriate social mannerisms in interviews
4. Solve placement test questions on verbal ability, quantitative aptitude and reasoning

References:

1. Verbal Ability & Reading Comprehension by Arun Sharma and Meenakshi Upadhyay
2. Study material for CAT, SAT, GRE, GMAT by TIME, CareerLauncher and IMS etc.
3. Quantitative Aptitude by R S Agarwal S Chand Publications
4. Quantitative Aptitude by Pearson Publications

CLAD2011: Preparation for Higher Education (GRE/ GMAT)-1 (Soft Skills 5B)

L	T	P	S	J	C
0	0	2	0	0	1

Course Description:

1. The course offers a special track for students who aspire to go abroad in pursuit of their higher education for which a GRE/ GMAT score is a prerequisite. It covers all four topical areas of these tests and includes fully solved mock tests as well.

Course Objectives:

1. Prepare the students to solve questions from all four broad areas of GRE/ GMAT
2. Orient the students for GRE/ GMAT through mock tests

1. Verbal Reasoning: Reading Comprehension, Sentence Equivalence, Text Completion, Sentence Correction, Critical Reasoning
2. Quantitative Reasoning: Arithmetic, Algebra, Geometry, Data Analysis
3. Analytical Writing Assessment: Issue/ Argument
4. Integrated Reasoning

Course Outcomes:

1. Solve questions from all four broad areas of GRE/ GMAT
2. Practice answering several mock tests

References:

1. Verbal Ability & Reading Comprehension by Arun Sharma and Meenakshi Upadhyay
2. Study material for CAT, SAT, GRE, GMAT by TIME, CareerLauncher and IMS etc.
3. Quantitative Aptitude by R S Agarwal S Chand Publications
4. Quantitative Aptitude by Pearson Publications

CLAD2021: Preparation for CAT/ MAT - 1
(Soft Skills 5C)

L	T	P	S	J	C
0	0	2	0	0	1

Course Description:

The course offers a special track for UG students who aspire to go for higher education in business management in India for which cracking CAT/ MAT/ other related test is mandatory. It covers all four topical areas of these tests and includes fully solved mock tests as well.

Course Objectives:

1. Prepare the students to solve questions from all four relevant areas of CAT/ XAT/ MAT, etc.
2. Orient the students for CAT/ XAT, etc. through mock tests

1. Quantitative Ability: Arithmetic, Algebra, Geometry, Mensuration, Calculus, Trigonometry

2. Data Interpretation: Data Interpretation and Data Sufficiency

3. Logical Reasoning: Data Management, Deductions, Verbal Reasoning and Non-Verbal Reasoning
4. Verbal Ability: Critical Reasoning, Sentence Correction, Para Completion, Para Jumbles, Reading Comprehension

Course Outcomes:

1. Solve questions from all four relevant areas of CAT/ MAT as listed above
2. Practice test-cracking techniques through relevant mock tests

References:

1. Verbal Ability & Reading Comprehension by Arun Sharma and Meenakshi Upadhyay
2. Study material for CAT, SAT, GRE, GMAT by TIME, CareerLauncher and IMS etc.
3. Quantitative Aptitude by R S Agarwal S Chand Publications
4. Quantitative Aptitude by Pearson Publications

CLAD2031: Preparation for Campus Placement-2

(Soft Skills 6A)

L	T	P	S	J	C
0	0	2	0	0	1

Course Description:
This course builds on the previous course and focuses on all four major areas of campus placements, including career preparedness, mock interviews, verbal ability, quantitative aptitude and logical reasoning.

Course Objectives:

1. To comprehensively prepare all eligible and aspiring students for landing their dream jobs.
2. To sharpen the test-taking skills in all four major areas of all campus drives

1. Career Preparedness II: Mock Interviews, Feedback and Placement Readiness

2. Verbal Ability II: Practising Reading Comprehension, Error Detection, Sentence Completion, MCQs, FIBs, Para jumbles, Cloze Test, Critical Reasoning

3. Quantitative Aptitude II: Number Systems, Algebra, Geometry, Data Handling, Data Sufficiency, Word Problems

4. Reasoning II: Logical and Verbal Reasoning

Course Outcomes:

1. Demonstrate career preparedness and confidence in tackling campus interviews
2. Solve placement test questions of a higher difficulty level in verbal ability, quantitative aptitude and logical reasoning.
3. Practice test-taking skills by solving relevant questions accurately and within time.

References:

1. Verbal Ability & Reading Comprehension by Arun Sharma and Meenakshi Upadhyay
2. Study material for CAT, SAT, GRE, GMAT by TIME, CareerLauncher and IMS etc.
3. Quantitative Aptitude by R S Agarwal S Chand Publications
4. Quantitative Aptitude by Pearson Publications

CLAD2041: Preparation for Higher Education (GRE/ GMAT)-2 (Soft Skills 6B)

L	T	P	S	J	C
0	0	2	0	0	1

Course Description:

1. The course offers a special track for students who aspire to go abroad in pursuit of their higher education for which a GRE/ GMAT score is a prerequisite. It covers all four topical areas of these tests at a higher difficulty-level and includes fully solved mock tests as well.

Course Objectives:

1. Prepare the students to solve higher level questions from all four broad areas of GRE/ GMAT
2. Orient the students for GRE/ GMAT through mock tests

1. Verbal Reasoning II: Reading Comprehension, Sentence Equivalence, Text Completion, Sentence Correction, Critical Reasoning

2. Quantitative Reasoning II: Arithmetic, Algebra, Geometry, Data Analysis

3. Analytical Writing Assessment II: Issue/ Argument

4. Integrated Reasoning II

Course Outcomes:

1. Solve higher level questions from all four broad areas of GRE/ GMAT
2. Practice answering several mock tests

References:

1. Verbal Ability & Reading Comprehension by Arun Sharma and Meenakshi Upadhyay
2. Study material for CAT, SAT, GRE, GMAT by TIME, CareerLauncher and IMS etc.
3. Quantitative Aptitude by R S Agarwal S Chand Publications
4. Quantitative Aptitude by Pearson Publications

CLAD2051: Preparation for CAT/ MAT - 2
(Soft Skills 6C)

L	T	P	S	J	C
0	0	2	0	0	1

Course Description:

The course offers a special track for UG students who aspire to go for higher education in business management in India for which cracking CAT/ MAT/ other related test is mandatory. It covers all four topical areas of these tests at a higher level of difficulty and includes fully solved mock tests as well.

Course Objectives:

1. Prepare the students to solve all types of questions from all four relevant areas of CAT/ XAT/ MAT, etc.

1. Quantitative Ability II: Arithmetic, Algebra, Geometry, Mensuration, Calculus, Trigonometry
2. Data Interpretation II: Data Interpretation and Data Sufficiency
3. Logical Reasoning II: Data Management, Deductions, Verbal Reasoning and Non-Verbal Reasoning
4. Verbal Ability II: Critical Reasoning, Sentence Correction, Para Completion, Para Jumbles, Reading Comprehension

Course Outcomes:

1. Solve higher difficulty level questions from all four relevant areas of CAT/ MAT as listed above
2. Practice test-cracking techniques through relevant mock tests

References:

1. Verbal Ability & Reading Comprehension by Arun Sharma and Meenakshi Upadhyay
2. Study material for CAT, SAT, GRE, GMAT by TIME, CareerLauncher and IMS etc.
3. Quantitative Aptitude by R S Agarwal S Chand Publications
4. Quantitative Aptitude by Pearson Publications

FACULTY CORE
MATH 1131: MATHEMATICS – I

Hours per week:4 End Examination:30Marks

Credits:4 Sessionals:70Marks

Preamble :

This course is introduced to learn fundamental topics in mathematics in undergraduate level such as Matrices, Solutions of Linear system of Equations, eigen values and eigen vectors, interpolation , solution of algebraic and transcendental equations, numerical differentiation and numerical integration

Course Objectives:

- To understand the matrices and their uses in real life problems
- To learn the basic concept and applications of matrices
- To identify and estimate the function or function value using various interpolation formulae for the given equal interval and unequal interval data
- Ability to implement numerical methods for differentiation as well as for integration.
- Ability to solve numerically algebraic and transcendental equations

UNIT - I

Matrices -I : Determinants, properties of determinants, matrices, matrices operations, transpose of a matrix, adjoint of a square matrix, inverse of a matrix, rank of matrix.

(10) **Learning Outcomes:**

By the end of this Unit, the student will be able to

- Define determinant of a square matrix and properties of determinants.(L1)
- Discuss various matrices with examples.(L6)
- Evaluate adjoint and inverse of a square matrix for a given matrix.(L5)
- Choose appropriate method to find rank of a matrix.(L5)
- Extend the concepts of row operations and column operations to find rank of amatrix.(L2)

UNIT - II

Matrices -II : Solution of linear system of equations : Cramer's rule, matrix inversion method, Consistency of linear system of equations, eigen values and eigen vectors, Cayley-Hamilton theorem(withoutproof). (10)

Learning Outcomes:

By the end of this Unit, the student will be able to

- Illustrate the concept of linear system of equations.(L2)
- Evaluate linear system of equations using Cramer's rule and Matrix inversion method.(L5)
- Explain consistency of linear system of equations with the help of finding rank of a matrix.(L5)
- Evaluate eigen values and eigen vectors of a matrix.(L5)
- Develop Cayley Hamilton theorem for a given matrix.(L6)

UNIT - III

Interpolation: Operators, Forward and Backward Difference Operations and Their Interrelation. Interpolation Formulae: Newton's Forward, Backward and Divided Difference Formulae, Lagrange'sFormula. (10)

Learning Outcomes:

By the end of this Unit, the student will be able to

- Explain the need of forward and backward difference operators(L2)
- Apply forward and backward difference operators to interpolate the function value using Newton's forward and backward formulae.(L3)
- Evaluate the function value or function for the given table values using divided difference formula.(L5)

- Evaluate the function or function value for the given tabular values using Lagrange's formula. (L5)

UNIT - IV

NumericalDifferentiation&Integration: NumericalDifferentiation:Formulaeforderivatives, **NumericalIntegration**:Trapezoidalrule,Simpson's1/3rule,Simpson's3/8rule,Weddle'srule. (10)

Learning Outcomes:

By the end of this Unit, the student will be able to

- Explain the need of numerical differentiation and numerical integration.(L2)
- Summarize different types of rules to solve numerical integration problems.(L2)
- Evaluate the numerical differentiation problems using Newton's forward and backward formulae.(L5)
- Evaluate the numerical integration problems using trapezoidal rule, simpson's rule and weddle's rule and comparing with direct method.(L5)

UNIT - V

Solution of Algebraic and Transcendental Equations: Bisection Method, False Position Method, Gauss elimination method, Jacobi's iteration method, Gauss-Siedaliterationmethod. (10)

Learning Outcomes

By the end of this Unit, the student will be able to

- Evaluate numerically the algebraic and transcendental equations.(L5)
- Explain procedure to solve an equation using bisection method and false position method.(L2)
- Evaluate problems using Gauss elimination method.(L5)
- Evaluate the problems using Jacobi's and Gauss-Seidal iteration methods.(L5)

Text Book :

1. Higher Engineering Mathematics by B.S.Grewal, Khanna Publishers, 43rd edition,2015.

Reference Book:

1. Introductory methods of numerical analysis by S.S.Sastry, PHI, 5th edition,2012.
2. Engineering Mathematics by B.V. Ramana, Tata Mc.Graw Hill, 1stedition,2006.

Course Outcomes:

Upon completion of the course, the student is able to

- Able to describe various matrices with examples.
- Able to evaluate operations on matrices.
- Able to choose appropriate method to find rank of matrix.
- Illustrate the concept of linear system of equations.
- Able to evaluate linear system of equations using Cramer's rule and Matrix inversion method.
- Evaluate eigen values and eigen vectors of a matrix.
- Able to apply forward and backward difference operators to interpolate the function value using Newton's forward and backward formulae.
- Evaluate the function value or function for the given table values using divided difference formula and Lagrange's formula.
- Explain the need of numerical differentiation and numerical integration.
- Able to summarize different types of rules to solve numerical integrations and numerical differentiation.
- Able to evaluate numerically the algebraic and transcendental equations.
- Explain procedure to solve an equation using bisection method and false position method.
- Evaluate problems using Gauss elimination method, Jacobi's and Gauss-Seidaliteration methods.

MATH1141: MATHEMATICS - II

Hours per week:4 End Examination:30Marks

Credits:4 Sessionals:70Marks

Preamble:

This course is introduced to impart knowledge of basic computer concepts such as Mathematical Logic, Set Theory, Relations, Lattices and Boolean Algebra, and Graph Theory.

Course Objectives:

- To understand the basic concepts of set theory and relations
- To learn the basic concept and applications of functions and counting
- To evaluate inference theory problems in proposition calculus
- Ability to learn about lattices and Boolean algebra.
- To understand the concept of graphs, directed graphs and trees.

UNIT - I

Set Theory and Relations: Sets, Set Operations, Algebra of Sets, Classes of Sets, Power Sets, Partitions, Relations, Representations of Relations, Composition of Relations, Types of Relations, Partial Ordering Relations, n-aryRelations. (10)

Learning Outcomes:

By the end of this Unit, the student will be able to

- Describe the basic concepts of sets and operations onsets.(L2)
- Describe different types of relations and representations of relations.(L2)
- Evaluate composition of relations.(L1)
- Explain the procedure to draw Hasse diagrams for partial order relations.(L2)
- Explain the concept of n-ary relations.(L2)

UNIT - II

Functions and Counting : Functions, One-to-One, onto and Invertible Functions, Mathematical, Exponential and Logarithmic Functions, Basic Counting Principles, Permutations, Combinations, The Pigeonhole Principle, The Inclusion –Exclusion Principle.(10)

Learning Outcomes:

By the end of this Unit, the student will be able to

- List the difference between various functions.(L1)
- Describe the basic concepts of counting principles.(L2)
- Explain the concepts of permutations and combinations (L2)
- Evaluate the problems using the Pigeonhole principle.(L5)
- Evaluate the problems with the help of inclusion-exclusion principle.(L5)

UNIT - III

Logic and Propositional Calculus: Propositions and Truth Tables, Tautologies, Logical Equivalence, Algebra of Propositions, Arguments, Logical Implication, Propositional Functions, Quantifiers. (10)

Learning Outcomes:

By the end of this Unit, the student will be able to

- Evaluate truth tables for all propositions with and without connectives.(L5)
- Evaluate logical equivalence formulas using truth tables and also without using truth tables.(L5)
- Use logical implication and equivalence formulas in proposition calculus.(L5)
- Outline the different types of propositional functions.(L5)
- Outline the different types of Quantifiers.(L5)

UNIT – IV

Lattices and Boolean algebra: Ordered, Sets, Hasse Diagrams, Lattices, Distributed Lattices & Complimented Lattices, Boolean algebra, Sum of Products form forBoolean algebra. (10)

Learning Outcomes:

By the end of this Unit, the student will be able to

- Explain the need of Hasse diagrams in lattices.(L2)
- Summarize different types of lattices.(L2)
- Define the Boolean algebra using lattices.(L5)
- Evaluate the problems on lattices.(L5)
- Evaluate the problems on Boolean algebra.(L5)

UNIT - V

Graph Theory: Graphs, Multi graphs, Directed graphs, Isomorphic Graphs, Paths, Connectivity Complete, Regular and Bipartite Graphs, Planar Graphs, Tree Graphs, Spanning Trees, Kruskal Algorithm, Warshall Algorithm for Path Matrix and Shortest –Path Matrix. (10) **Learning Outcomes**

By the end of this Unit, the student will be able to

- Analyze and Classify various types of graphs.(L4)
- Construct graphs as per the definition.(L3)
- Explain tree graphs with examples.(L2)
- Apply the concept of Krushkal algorithm to find minimum spanning tree of a given connected graph.(L3)
- Evaluate shortest path matrix using shortest path algorithm.(L5)

Text Books:

1. Discrete Mathematics (Schaum's Outline Series) by Seymour Lipschutz, Marc Lipson, Tata Mc- Graw Hill, 2nd edition.
2. Discrete Mathematics and its applications by Kenneth H. Rosen, Tata Mc-GrawHill.

Reference Book:

1. Discrete Mathematical Structures with applications to Computer Science by Tremblay and R.Manohar, Tata Mc Grawhill education.

Course Outcomes:

Upon completion of the course, the student is able to

- Able to describe the basic concepts of sets and operations onsets.
- Describe different types of relations and representations of relations.
- Able to explain the procedure to draw Hasse diagrams for partial order relations.
- Able to differentiate various functions.
- Explain the concepts of permutations and combinations and Pigeonhole principle.
- Evaluate logical equivalence formulas using truth tables and also without using truth tables.
- Use logical implication and equivalence formulas in proposition calculus.
- Able to outline the different types of propositional functions and types of Quantifiers.
- Explain the need of Hasse diagrams in lattices and summarize different typesoflattices.
- Define the Boolean algebra using lattices.
- Able to classify various types of graphs.
- Explain tree graphs with examples.
- Able to find minimum spanning tree of a given connected graph and shortest path matrix.

ELEMENTARY STATISTICS

Hours per week: 4 End Examination: 60Marks

Credits:4 Sessionals: 40Marks

Preamble:

Elementary statistics deals with the collection, analysis, interpretation, and presentation of data. Probability and Statistics for Computer Science treats the most common discrete and continuous distributions, showing how they find use in decision and estimation problems, and constructs computer algorithms for generating observations from the various distributions.

Course Objectives:

- To understand the difference between primary and secondary data
- To learn the basic concepts in applications of statistics and graphical presentation of data
- To understand the concept of measures of central tendency
- Ability to implement features of measures of dispersion.
- To understand the concept of correlation and regression.
- To understand the difference between discrete and continuous random variables and probability
- To evaluate problems on discrete and continuous probability distributions

UNIT - I

Introduction: Statistical Data and Methods, Applications of Statistics, Primary and Secondary data, Methods of collecting primary data, Tabulation of data, Diagrammatic and Graphic presentation of data.(10)

Pedagogy tools:

Lecture , Blended Learning

Learning Outcomes:

By the end of this Unit, the student will be able to

- List the difference between primary and secondary data.(L1)
- Discuss the basic concepts of statistics.(L6)
- Choose appropriate data to represent graphically.(L6)
- Explain diagrammatic and graphic presentation of data for grouped and ungrouped data.(L5)

UNIT – II

Measures of Central Value & Dispersion: Arithmetic mean, Median, Mode, Range, Quartile deviation, Mean deviation, Standard deviation. (8)

Pedagogy tools:

Lecture , Blended Learning

Learning Outcomes:

By the end of this Unit, the student will be able to

- List the difference between arithmetic mean, median and mode.(L1)
- Discuss the basic concepts of measures of central tendency.(L6)
- Discuss the basic concepts of measures of dispersion (L6)
- Evaluate Mean deviation, standard deviation , and variance for ungrouped data.(L5)
- Evaluate Mean deviation, standard deviation , and variance for grouped data.(L5)

UNIT – III

Correlation and Regression : Types of correlation, Methods of studying Correlation, Karl pearson's coefficient of Correlation, Properties of the coefficient of correlation, Rank correlation coefficient, Uses of regression analysis, Difference between correlation and regression analysis,

Regression lines, Regression equations. (10)

Pedagogy tools:
Lecture , Blended Learning

Learning Outcomes

By the end of this Unit, the student will be able to

- Apply coefficient of correlation to ungrouped data.(L3)
- Explain the properties of the coefficient of correlation.(L5)
- Apply rank correlation coefficient to ungrouped data.(L3)
- Outline the different types of correlations.(L2)
- Explain regression analysis for the given data.(L5)

UNIT – IV

Probability : Definition of probability, Addition theorem on probability, Multiplication theorem on probability, Baye's theorem, Mathematical expectation. (10)

Pedagogy tools:
Lecture , Blended Learning

Learning Outcomes

By the end of this Unit, the student will be able to

- Define probability with suitable examples.(L1)
- Explain the additional theorem on probability.(L5)
- Explain multiplication theorem on probability.(L5)
- Evaluate the problems on Bayes' theorem.(L5)
- Evaluate the problems on Mathematical expectation.(L5)

UNIT – V

Probability Distributions: Random variable and probability distribution, Binomial distribution, fitting a Binomial distribution, Poisson distribution, Fitting a Poisson distribution, Normal distribution, Area under the normal curve. (10)

Pedagogy tools:
Lecture , Blended Learning

Learning Outcomes

By the end of this Unit, the student will be able to

- Compare discrete random variable and continuous random variable.(L5)
- Construct probability distribution function.(L6)
- Compare Binomial and poisson distributions.(L5)
- Evaluate to fit a poission distribution.(L5)
- Explain normal distribution with examples.(L5)

Text Book :

1. Statistical Methods by S.P. Gupta, Sultan Chand &sons publication, 44th edition, 2017.

Reference Book :

1. Probability and Statistics for Engineers by G.S.S. Bhishma Rao, Sci-tech publishers,4th edition, 2010.

Course Outcomes:

Upon completion of the course, the student is able to

- Able to differentiate between primary and secondary data.
- Present the data in pictorial format.
- Learn different measures of central tendency.
- Able to apply of measures of dispersion, correlation and regression.
- Able to differentiate between discrete and continuous random variables

PROGRAM CORE

CSC11061: INTRODUCTION TO INFORMATION TECHNOLOGY

Hours per week:4 End Examination:30Marks
Credits:4 Sessionals:70Marks

Preamble: The course is designed for an introductory core course in Information Technology to the UG students as IT is a rapidly advancing technology.

Course Objectives:

- To emphasize reasonably stable fundamental concepts on which Information technology is built.
- To make the student familiarize in IT and their applications to business processes.

UNIT – I

Data and Information: Introduction, Types of data, Simple model of a computer, Data processing using a computer, Desktop computer.
Acquisition of Numbers and Textual Data: Introduction, input units, internal representation of numeric data, Representation of characters in computers, Error Detecting codes.
Processing and Displaying Textual Data: Word processor, Desktop Publishing, Page Description language, Mark-up Languages. (10)

Learning Outcomes:
By the end of this Unit, the student will be able to:

- Differentiate between data and information.(L1)
- Classify different types of data which are processed by computers.(L1)
- Explain the functions of the units of a desktop computer.(L3)
- Describe how data is processed by computer.(L3)
- Enumerate various devices used to input numbers and character.(L1)
- Distinguish between internal and external representation of data.(L1)
- Explain why binary digits are used to represent numbers and characters in computers.
- Convert decimal numbers to binary and vice versa.(L3)
- Distinguish between encoding and conversion of numbers and explain when they are appropriate.(L1)
- Convert binary numbers to hexadecimal numbers.(L2)
- Encode numbers and characters using ASCII.(L3)
- Explain the need for error detection and the use of parity bits.(L3)

UNIT – II

Data storage: Introduction, Storage cell, Physical devices used as storage cells, Random access memory, Read only memory, Secondary storage, Compact disk read only memory (CDROM), Archival store.
Central Processing Unit: Introduction, Structure of a central processing unit, Specifications of a CPU, Interconnection of CPU with memory and I/O units, Embedded processors.
Output Devices: Video Display Devices, Touch Screen, Printers, Audio Output. (10)

Learning Outcomes:
By the end of this Unit, the student will be able to:

- Explain the need to store data in computer.(L2)
- Describe the different types of units used in a computer to store data and their characteristics.(L3)
- Explain the importance of Central Processing Unit (CPU) of a computer & how a CPU processes data and computes.(L2)
- Describe how a CPU is interconnected with other units of a computer and cooperates with them to solve problems.(L3)

- List the types of devices used with computers to output processed data.(L1)
- Explain how an audio output unit works and its application.(L2)

UNIT – III

Computer Networks: Introduction, Local Area Network (LAN), Applications of LAN, Wide Area Network (WAN), Internet, Naming computers connected to Internet, Future of Internet Technology. **Computer Software:** Introduction, Operating system, Programming languages, Classification of programming languages, Classification of Programming Languages based on applications.

Processing Multimedia Data: Graphics Processing, Audio Signal Processing. **Acquiring Audio Data -** Basics of Audio Signals, Acquiring and storing Audio Signals, Compression of Audio Signals.

Acquisition of Video: Computing a moving Scene with a video camera, Compression of Video Data, MPEG Compression standard. (12)

Learning Outcomes:

By the end of this Unit, the student will be able to:

- Describe computer networks and their various types.(L2)
- Explain why computers are networked and the advantages of doing it.(L2)
- Describe how computers are connected to form computer networks.(L2)
- Trace the evolution of the Internet and explain how it works.(L1)
- Explain the difference between hardware and software and why software is essential to make a computer useful.(L1)
- Understand the difference between system and application software and their roles ina computer.(L1)
- Describe why an operating system is required for a computer and its functions.(L2)
- Explain why programming languages are required.(L2)
- Classify programming languages.(L1)
- Understand the difference between image processing, image generation and image recognition.(L1)
- Explain image morphing and animation.(L2)
- Differentiate between audio data editing, audio data generation and audio data recognition. (L1)
- Explain how analog audio signals can be converted to digital form.(L2)
- Calculate the number of bits required to store digitized audio signal for a specific time period.(L2)
- Explain why digitized audio data should be compressed.(L2)
- Explain the principles used in MP3 compression standard.(L2)
- Explain how moving pictures are captured, digitized, and stored.(L2)
- Explain why it is necessary to compress digitized video.(L2)
- Describe the methods used to compress video.(L3)

UNIT – IV

Data organization: Introduction, Organizing a database, Structure of a database, Database Management System, Example of database design, Non-text databases, Archiving databases.

Processing Numerical Data: Introduction, Use of spreadsheets, Numerical computation examples. **Business Information Systems:** Introduction, Types of Information Needed by Organization. (10)

Learning Outcomes:

By the end of this Unit, the student will be able to:

- Explain the need to systematically organize data for storage in a computer memory.(L2)
- Explain what a database management system is and why it is needed.(L2)
- Explain how a database is organized as relations and describe the parts of a relation.(L2)

- Organize non-text databases such as audio files and image files for easy retrieval.(L2)
- Explain the need to back up databases to recover data resources lost or damaged due to accidents.(L2)
- How to use a spreadsheet program to solve numerical problems.(L2)
- Explain what business information is and why it is useful.(L2)
- How to classify information systems as operational, tactical, strategic and statutory.(L2)
- Understand management of organizations & specific functions, their hierarchical levels. (L1)
- Determine the information needs of managers in each level of the hierarchy.(L2)
- Distinguish between Transaction Processing System, Management Information System (MIS) and Decision Support System(DSS).(L1)
- Explain how to design an operational information system.(L2)
- Enumerate the steps in designing a business information system known as system life cycle.(L2)

UNIT-V

Some Internet Applications: Introduction, Email, World Wide Web, Information Retrieval from the WWW - Browsers.

E-Commerce: Introduction, Business to customer E-commerce, Business to business E-commerce, Customer to customer E-commerce, Advantages and disadvantages of E-commerce, E-commerce system architecture, Digital signature, Payment schemes in E-commerce, Electronic clearing service in E-commerce, Cash transactions in E-commerce, Payment in C2C E-commerce, Electronic data interchange, Intellectual property rights and E-commerce, Information technology act.

Social Impacts of Information Technology: Introduction, Social uses of www, Privacy, Security and integrity of information, Disaster recovery, Intellectual property rights, Careers in Information technology. (10)

Learning Outcomes:

By the end of this Unit, the student will be able to:

- Search for information in the Internet using one of several search engines.(L2)
- Select a search engine appropriate for ones search requirements.(L2)
- Use a browser to download files and log on to a remote computer.(L2)
- Explain how Internet telephone works.(L2)
- Distinguish between downloading and streaming audio and video files.(L2)
- Calculate the time required to download audio and video files.(L3)
- Estimate the buffer size requirements for streaming audio and video files.(L2)
- List the advantages and disadvantages ofe-commerce.(L1)
- Explain Electronic Data Interchange (EDI) ine-commerce.(L2)
- Describe how security is ensured in e-commerce using data encryption and digital Signature.(L2)
- Explain various electronic payment systems used ine-commerce.(L2)
- Identify legal issues in e-commerce.(L1)
- Explain how information technology is affecting our daily life.(L2)
- Distinguish between privacy. Security and integrity of information.(L2)
- Protect your computing resources and be able to recover from disasters.(L2)
- Explain what intellectual property rights are and how to avoid infringing them.(L2)

Text Books:

1.Introduction to Information Technology by V. Rajaraman, PHI Learning Pvt.Ltd. 2013.

Reference Books:

1. Computing Fundamentals by Peter Norton, Tata Mc. Graw Hill, 6th edition,2006.

2. Fundamentals of Computers by E.Balagurusamy, Tata McGraw Hill,2009.

Course Outcomes:

Upon completion of the course, the student is able to

- Understand what a data is and what the information is.(L3)
- Analyze how data is processed by a computer.(L4)
- Discuss Hardware and Software.(L6)
- Demonstrate the basic parts of the Computer.(L3)
- List different types of Data.(L4)
- Analyze how to Organize Data.(L4)
- Apply IT on Business processes.(L3)

CSC11051: PROBLEM SLOVING AND PROGRAMMING WITH PYTHON

Hours per week:4 End Examination:30Marks

Credits:4 Sessionals:70Marks

Preamble:

Python is an Internet and systems programming language that is soaring in popularity in today's fast-paced software development environment, and its simple (yet robust), object-oriented (yet can be used as a procedural language), extensible, scalable and features an easy to learn syntax that is clear and concise. Python combines the power of a compiled object language like Java and C++ with the ease of use and rapid development time of a scripting language. Its syntax is so easy to understand that students are likely to pick it up faster than any of the other popular scripting languages in use today! Python is a fully object-oriented programming language, but students do not have to understand object-oriented concepts to start programming in Python.

Course Objective:

- To explain the elementary programming constructs and input and output statements and use it in Python programming.
- To identify and practice different conditionals and loop control statements.
- To provide knowledge on different built in data structures like strings, lists, tuples, dictionaries and use these in python programming.
- To explain the concept functions, recursive functions, file and exception handling mechanisms in Python.

UNIT – I

Introduction to Computers and Programming: Introduction, Hardware and Software, How Computers Store Data, How a Program Works, Using Python.

Core Python: What is Python, History, features, Installing, Running, Getting Started, Syntax and Style, Python Objects, Numbers, Keywords, Operators, Syntax, Compilers and Interpreters, The Python Interpreter. (10)

Learning Outcomes:

By the end of this Unit, the student will be able to:

- Discuss how computers work, how data is stored and manipulated, and why we write programs in high level languages.(L2)
- Understand how to use Python, the IDE environment and how to obtain and install Python on your system.(L2)
- Describe what is python, its history, features, benefits.(L2)
- Explain the basic Python concepts and statements.(L2)
- Understand the proper syntax and style of Python , keywords, operators and its memory management ability.(L1)
- Explain the difference between compiler and Interpreter.(L1)
- Understand how the first python code looks like .(L2)
- Explain data types, operators, built-in-functions used in python and their syntax.(L2)

UNIT – II

Input, Processing, and Output: Designing a Program, Input, Processing, and Output, Displaying Output with the print Statement, Comments, Variables, Reading Input from the Keyboard, Performing Calculations, More about Data Output.

Decision Structures and Boolean Logic: The if Statement, The if -else Statement, Comparing Strings, Nested Decision Structures and the if -elseif -else Statement, Logical Operators, Boolean Variables. (12)

Learning Outcomes:

By the end of this Unit, the student will be able to:

- Describe the program development cycle.(L2)

- Understand what a program is supposed to do before determining the steps that the program will perform.(L2)
- Explain the step by step process of a typical computer program.(L2)
- How use the print statement to display output in a Python program.(L2)
- To know about variable, data types, mathematical operators , operator precedence, data type conversion, assignment statement, expressions.(L2)
- How to read input from the keyboard, what are variable naming rules.(L2)
- What are escape characters, formatting.(L2)
- How to write simple programs in python that read input from the keyboard.(L2)
- Understand what is meant by decision structures and the syntax of different decision structures.(L2)
- How to use explain relational operators, Boolean variables & expressions, Boolean operators and to use in decision structures to control the flow of program.(L2)
- Write Pseudo code and flowcharts that are also introduced as tools for designing programs.(L2)
- Explain Nested decision structures and logical operators.(L2)
- Designing simple python programs using decision structures.(L2)

UNIT – III

Repetition Structures: Introduction to Repetition Structures, The while Loop: a Condition-Controlled Loop, The for Loop: a Count-Controlled Loop, Calculating a Running Total, Sentinels, Input Validation Loops, Nested Loops. (10)

Learning Outcomes:

By the end of this Unit, the student will be able to:

- Understand what is repetition structures and how to create repetition structures using the while -loop and for –loop and flowcharts and their syntax.(L2)
- Differentiate condition-controlled loop & count-controlled loop.(L1)
- What is loop iteration. Does the while loop test its condition before or after it performs an iteration?(L2)
- Brief description of nested loops.(L2)
- Understand counters, running totals, infinite loops, accumulated variables, use of sentinel and general description of Input validation process.(L2)
- Designing simple python programs using while loop and for loop.(L2)

UNIT - IV

Data Structures: Lists, Quick Introduction to Objects and Classes, Tuple, Dictionary, Sequence, Set, Working with Strings. (10)

Learning Outcomes:

By the end of this Unit, the student will be able to:

- List the built-in data structures in python.(L1)
- Access values, update elements in list, delete list elements. (L2)
- Identify the difference between a list and a tuple.(L1)
- Access values in tuples, update, delete tuple elements.(L2)
- Access values in Dictionary, upde, delete dictionary elements.(L3)
- Specify the properties of Dictionary keys.(L1)
- Define OOP, class, object.(L1)
- How to use a string in python.(L2)
- Illustrate string methods.(L2)
- Working with strings.(L2)

UNIT - V

Functions: Introduction to Functions, Defining and Calling a Function, Designing a Program to Use Functions, Local Variables, Passing Arguments to Functions, Global Variables and Global Constants.

Files and Exceptions: Introduction to File Input and Output, Using Loops to Process Files, Processing Records, Exceptions. (10)

Learning Outcomes:

By the end of this Unit, the student will be able to:

- Identify what is a function in Python.(L3)
- How to call a function in Python.(L3)
- Write python programs using functions.(L3)
- Define local and global variables.(L1)
- Understand how to pass arguments to functions.(L3)
- Understand the basics of files.(L2)

Textbooks:

1. Starting Out with Python, Tony Gaddis, Haywood Community College, Pearson,2018.
2. Core Python Programming, Wesley J. Chun, Prentice Hall PTR, First Edition,2000.

Reference Book:

1. How to Think Like a Computer Scientist: Learning with Python by Jeffrey Elkner, Allen B. Downey and Chris Meyers, Samurai Media Limited,2016.

course Outcomes:

Upon completion of the course, the student is able to

- Build knowledge about basic Python language syntax and semantics.(L5)
- Analyze programming skills in core python.(L4)
- What python programs and use concepts such as variables, conditional and iterative execution methods.(L1)
- Explain basic principles of Python Programming Language.(L5)

CSC 11131: FUNDAMENTALS OF DIGITAL LOGIC CIRCUITS

Hours per week:4 EndExamination:30Marks

Credits:4 Sessionals:70Marks

Preamble: This Course provides the knowledge and fundamentals of logic gates, Encoders & decoders implementation and Number Conversion system. It also underpins other areas of the digital circuits such as Registers.

Course Objective:

- To know about Binary systems and Number conversions
- To know about the Boolean algebra, logic gates and its operations.
- To understand about Digital logic fundamentals, Design steps of flip flops, Shift registers, Counters etc.

UNIT – I

Binary Systems: Digital Systems, Binary numbers, Number base conversion, Octal & Hexa-Decimal Numbers, Complements, Signed Binary numbers, Binary codes, Binary storage and registers, Binary Logic. (9)

Learning Outcomes: By the end of this unit, the student will be able to

- Illustrate the conversion of the numbers from one number system to other and vice-versa.(L2)
- Illustrate the compliments of the numbers.(L2)

UNIT – II

Boolean Algebra and Logic Gates: Basic Definition, Axiomatic definition of Boolean Algebra, Theorems and properties, Canonical form & Standard Form, Other Logic Operations, Digital Logic Gates, ICs. (10)

Learning Outcomes: By the end of this unit, the student will be able to

- Discuss the Boolean Algebra theorems and properties.(L4)
- Discuss input, output symbols and the function of the logic gates.(L4)

UNIT – III

Gate Level Minimization: Introduction, Map Method, Four and Five variable maps, POS Simplification, Don't care conditions, NAND and NOR Implementation, Other two Level Implementation, Ex-OR function. (10)

Learning Outcomes: By the end of this unit, the student will be able to

- Illustrate Optimal gate level minimization.(L2)
- Show logic functions using NAND and NOR gates.(L2)

UNIT – IV

Combinational Circuits: Introduction, Combinational Circuits, Analysis Procedure, Design Procedure, Binary Adder - Subtraction, Decimal Adder, Binary Multiplier, Magnitude Comparator, Decoder, Encoder, Multiplexer. (9)

Learning Outcomes: -By the end of this unit, the student will be able to

- Define the basic procedure to analyze combinational circuits.(L1)
- Explain the different types of combinational circuits.(L2)
- Develop encoders and decoders. multiplexers etc.(L3)

UNIT - V

Synchronous Sequential Circuits: Sequential Circuits, Latches, Flip-Flops, Analysis of Clocked Sequential Circuits, State reduction and Assignment, Design procedure.

Registers and Counters: Registers, Shift registers, Ripple Counters. (10)

Learning Outcomes: By the end of this unit, the student will be able to

- Outline of sequential circuits and flip-flops.(L2)
- Describe the State reduction and Design procedure.(L4)

Text Books:

1. Digital Design by M. Morris Mano, Michael D.Ciletti, Pearson edition, 4th edition. 2012.

Reference Books:

1. Fundamentals of Digital Logic Design by Stephen Brown and Zvonko Vranesic, McGraw Hill Education, 3rd edition, 2009.

course Outcomes:

Upon completion of the course, the student is able to

- To examine Binary systems and Number conversions.(L4)
- To discuss about the Boolean algebra, logic gates and its operations.(L6)
- To build Digital logic fundamentals, Design steps of flip flops, Shift registers, Counters etc.(L6)

CSCI1041: PYTHON PROGRAMMING LAB

Hours per week: 2 Continuous Evaluation: 100 Marks
Credits: 1

Objectives: To write, test, and debug simple Python programs. To implement Python programs with conditionals and loops. Use functions for structuring Python programs. Installing Python, executing Python, Python Standard Library, and Find where the python executable and standard library modules are installed on your system.

1. Start the Python interpreter in interactive mode.
2. Demonstrate to write, test, and debug simple Python programs.
3. Demonstrate Python syntax – identifiers, variables, keywords, Lines & Indentation, Quotation, and Comments.
4. Demonstrate the use operators- Arithmetic, Comparison, Assignment, Logical, Bitwise, Membership, Identity, and Operator Precedence.
5. Demonstrate assigning values to variable, Multiple Assignments, Standard Data Types-Numbers, Strings, Lists, Tuples, Dictionary, Data Type Conversion.
6. Demonstrate Decision Making &Loops-
    a. Check if a given number is divisible by5
    b. Sum of N different numbers
    c. Sum and average of N different numbers
    d. Sum of numbers between 1 and 50 which are divisible by 3 and not by5
    e. First N even numbers
    f. First N numbers divisible by4
7. Demonstrate Built-in functions.
8. Demonstrate the use of Lists.
    a. Create a list and perform the following operations on the list:
    b. Display content of list
    c. Display length of list
    d. Display element in given position in the list
    e. Add elements to the list
    f. Remove elements from the list:
    g. Slice
    h. Sort
    i. Reverse
    j. Replace elements
    k. Join two lists
    l. Membership test
    m. Nested lists
9. Demonstrate the use of Dictionaries.
    a. Creating a Dictionary and perform the following operations:
    b. Get the values in a Dictionary
    c. Looping over dictionary
    d. Add elements to a dictionary
    e. combine two dictionaries

f. Delete elements of a dictionary
g. Test the presence of a key

10. Demonstrate the use of Tuples
    a. Creating a Tuple
    b. Accessing values in Tuple
    c. Updating Tuples
    d. Delete Tuple elements
    e. Basic Tuple Operations
    f. Indexing, Slicing, Matrixes
11. Demonstrate the use of Functions
    a. Smallest number from a set of numbers
    b. Largest number from a set of numbers
    c. Sum of even and odd numbers from a set of numbers
    d. Sort the elements of a matrix
    e. Read an N x N matrix. Check if the last element of each row is the sum of the all other elements in that row
12. Demonstrate Files
    a. Read a file and display all words containing all 5 vowels at least once.
    b. Write a program to read student details (Name, roll number and CGPA) and write to file. Also display the file content.

Reference Books:

1. Head First Python by Barry, Paul, O Rielly Publications, 2nd Edition,2010.
2. Core Python Programming by Wesley J. Chun, Prentice Hall, First Edition,2000.
3. Learning Python by Lutz, Mark, O Rielly Publications, 4th Edition,2009.

Course Outcomes:

Upon completion of the course, the student is able to

- Analyze what is HLL programming and the purpose of Python.(L4)
- Build to Install python and Start the Python interpreter in interactive mode.(L3)
- Utilize correct syntax and write simple programs.(L3)
- Utilize operators, Built-in functions, user-defined functions, Lists , Dictionary, Tuples.(L3)
- Construct with conditional statements, decision making loops.(L6)
- Define fundamental knowledge on file concepts.(L1)

CSC11071: DATA ANALYSIS LAB

Hours per week: 2 Continuous Evaluation:**: 100 Marks**
Credits: 1

Objectives: To familiarize the student to explore powerful data analysis tool. To train the student to use the Adobe motion graphics creation tool to Animate, create animation and interactivity to produce visuals such as banner ads, slideshows, animations, and other forms of rich media

A. Data Analysis using Excel

1. **About Excel & Microsoft** - Uses of Excel, Excel software, Spreadsheet window pane, Title Bar, Menu Bar, Standard Toolbar, Formatting Toolbar, the Ribbon, File Tab and Backstage View, Formula Bar, Workbook Window, Status Bar, Task Pane, Workbook &sheets
2. **Work with Columns & Rows -** Selecting Columns & Rows , Changing Column Width & Row Height, Auto fitting Columns & Rows, Hiding/ Unhiding Columns & Rows, Inserting & Deleting Columns & Rows, Cell, Address of a cell, Components of a cell – Format, value, formula, Use of paste and past especial.
3. **Demonstrate Functionality Using Ranges** - Using Ranges, Selecting Ranges, Entering Information Into a Range, Using AutoFill Creating Formulas. (4 hours) Using Formulas, Formula Functions – Sum, Average, if, Count, max, min, Proper, Upper, Lower, Using AutoSum.
4. **Use Advance Formulas -** Concatenate, Vlookup, Hlookup, Match, Countif, Text,Trim
5. **Demonstrate Spreadsheet Charts** - Creating Charts, Different types of chart, Formatting Chart Objects, Changing the Chart Type, Showing and Hiding the Legend, Showing and Hiding the Data Table.
6. **Perform Data Analysis project**

Reference Book:

1. Data Analysis With Microsoft Excel , Kenneth N. Berk , Patrick Carey, Cengage Learning.

Course Outcomes:

Upon completion of the course, the student is able to

- Understand how to use the Excel spreadsheet for data analytics.
- Implement and use the functions and formulas in the Excel.
- Understand the usage of various graphs.

CSCI1091: WEB TECHNOLOGIES

Hours per week:4 End Examination:30Marks
Credits:4 Sessionals:70Marks

Preamble:
Web Technologies helps to learn about the HTTP communication protocol, about the markup languages HTML, XHTML and XML, the CSS and XSLT standards for formatting and transforming web content, interactive graphics and multimedia content on the web, client-side programming using JavaScript.

Course Objectives:

- To develop a dynamic webpage by the use of JavaScript.
- To connect a java program to DBMS and perform insert, update and delete operations
- To write a well formed / valid XML document.
- To write a server side java application called JSP to catch form data sent from client and store it on database.

UNIT-I

Internet Basics: Basic Concepts, Communicating on the Internet, Internet Domains, Internet Server Identities, Establishing Connectivity on the Internet, Client IP address, Transmission Control Protocols.
Introduction to HTML: Information files creation, Web Server, Web Client/Browser, Hyper Text Markup Language, Commonly used HTML Commands.
LISTS: Types oflists. (12)

Learning Outcomes: By the end of this unit, the student will be able to

- Describe the basic concepts of Internet and Internet related topics. (L2)
- Differentiate the different protocols used for different purposes.(L1)
- Understand the HTML commands, Web Servers and lists.(L3)

UNIT - II

Adding Graphics to HTML Documents: Using the Attributes- Border, Width, and Height, Align and Alt Attributes.
Tables: Introduction, The Caption Tag, Using the width and boarder, Cell padding, Cell spacing, Using Background-Color property, Using the Colspan and Rowspan Attributes.
Linking Documents: Links, Images as Hyperlinks. FRAMES: Introduction to Frames. (10)
Learning Outcomes: -By the end of this unit, the student will be able to

- List out the different attributes in graphics.(L1)
- Implement the table attributes.(L3)
- Understand the concept of Frames.(L3)

UNIT – III

CSS2 - Introduction, Syntax, Selectors, Color Background Cursor, Text Fonts, Lists Tables, Box Model, Display Positioning, Floats.
Dynamic HTML: Cascading Style Sheets, Class, Using the TAG, External Style Sheets, Using the TAG.

(12)
Learning Outcomes: -By the end of this unit, the student will be able to

- Understand the concepts of Cascading Style Sheets.(L3)
- Implement the Dynamic HTML tags.(L3)

UNIT – IV

Introduction To JavaScript: JavaScript in web pages, The Advantages of JavaScript, Writing JavaScript into HTML, Basic Programming Techniques, Operators and Expressions in JavaScript, JavaScript Programming Constructs, Conditional Checking, Super controlled-endless

loops, Functions in JavaScript, User defined functions, Placing text in a Browser, Dialog Boxes. (12)

Learning Outcomes: -By the end of this unit, the student will be able to

- Describe the advantages of JavaScript.(L2)
- Understand the basic programming techniques.(L3)
- Implement loops, functions in JavaScript.(L3)

UNIT – V

The JavaScript Document Object Model: Introduction, the JavaScript assisted style sheets DOM (JSSS DOM).

Understanding Objects in HTML: Browser Objects, Handling (Web page) Events Using JavaScript. Forms used by A Web Site: The form Object, Other Built -In objects in JavaScript, User Defined Objects. (10)

Learning Outcomes: -By the end of this unit, the student will be able to

- Understand the JavaScript assisted style sheets.(L3)
- Differentiate the different Web Page Handling events using JavaScript.(L1)
- Implement a web page using different objects in JavaScript.(L3)

Text Book:

1. Web Enable Commercial Application Development Using HTML, JavaScript, DHTML and PHP by Ivan Bayross, BPB Publications, 4th revised edition, 2010 .

Reference Books:

1. Complete Reference HTML by T. A. Powell, 3rd edition, TMH,2003.
2. The Complete Reference - PHP by Steven Holzner, Tata McGraw Hill,2008.
3. Web Technology and Design by Xavier, C, New Age International,2013.

Course Outcomes:

Upon completion of the course, the student is able to

- Develop a dynamic webpage by the use of JavaScript.(L6)
- Build a java program to DBMS and perform insert, update and delete operations.(L6)
- Construct to write a well formed / valid XML document.(L6)
- Design a server side java application called JSP to catch form data sent from client and store it on database.(L6)

CSCI 1111: INTRODUCTION TO OBJECT ORIENTED PROGRAMMING WITH C++

Hours per week:4 End Examination:30Marks

Credits:4 Sessionals:70Marks

Preamble :

C++ is one of the most popular programming language. It contains object-orientation, a new programming concept used to create an object, in code, that has certain properties and methods or Units. The implementation of the Units helps to see the whole world in the form of objects. This course also helps in developing high quality software like system application software, drivers, client-server applications and embedded firmware.

Course Objectives:

- To understand the difference between procedure oriented programming and object oriented programming.
- To learn the basic concepts and applications of OOPS and practice object oriented analysis and design in the construction of robust, maintainable programs which satisfy the requirements of users.
- To identify and practice the object-oriented programming concepts and techniques, practice the use of C++ classes and class libraries, modify existing C++ classes, develop C++ classes for simple applications and implement features of object oriented programming in solving real world problems using Inheritance, Data abstraction, Encapsulation and Polymorphism.
- To understand the concept of file and handling function to perform file operations like accessing the data from file and store the data into file.

UNIT – I

Principles of Object Oriented Programming: Software Evolution, Procedure oriented Vs Object Oriented Programming Paradigm, Basic Concepts of OOPs, Benefits of OOP, Features and Applications of OOP, Structure of C++ program. Tokens, Expressions and control structures: Introduction, Tokens, Keywords, Identifiers and Constants, Basic Data types, User-Defined Data types, Derived Data Types and Sizes, Dynamic Initialization of variables, Reference Variables, Scope Resolution Operator, Type Cast Operator, Expressions and their types. (10)

Learning Outcomes:

By the end of this Unit, the student will be able to

- List difference between procedure and object oriented programming, applications of OOP.(L1)
- Describe the basic concepts of object oriented programming.(L2)
- Develop and run simple C++ programs.(L3)
- Choose appropriate data type and operators in programs.(L3)
- Extend the concepts of C++ in developing efficient programs.(L3)

UNIT – II

Functions in C++: Function Prototype, call by reference, Inline functions, Default Arguments, Const arguments Function Overloading, Library Functions. Classes and Objects: Introduction, Specifying a class, making an outside function inline, Arrays within a class, Defining Member functions, Memory Allocation for Objects, array of Objects, Static Data Members, Static Member Functions, Friend Functions. (10)

Learning Outcomes

By the end of this Unit, the student will be able to

- Compare and contrast parameter passing techniques of C and C++.(L2)
- Illustrate the concept of classes and objects.(L3)
- Develop real world applications by using appropriate concepts.(L3)
- Use static members in programming.(L3)
- Compare and contrast inline functions with macros.(L2)

UNIT – III

Constructor: Constructor Parameterized Constructor, Multiple Constructors in a Class, Copy Constructor, Dynamic Constructors, Destructors. Operator Overloading: Definition, Overloading Unary, Binary operators, Overloading Binary Operators using Friends, Manipulation of Strings using operators. (10)

Learning Outcomes

By the end of this Unit, the student will be able to

- Apply function overloading concept whenever required.(L3)
- Explain the need of friend function.(L2)
- Extend the concept of parameter passing techniques with objects.(L2)
- Outline the different types of Constructors. (L2)
- Use constructor and destructor in programming. (L3)

UNIT – IV

Inheritance: Introduction, Defining Derived Classes, Single Inheritance, Multiple Inheritance, Multi-Level Inheritance, Hierarchical Inheritance, Hybrid Inheritance, Virtual Base Classes. Constructors in Derived Classes. (10)

Learning Outcomes

By the end of this Unit, the student will be able to

- Explain the need of reusability concept with inheritance.(L2)
- Summarize different types of inheritance.(L2)
- Extend the overloading concept on operators.(L3)
- Recall the basics of pointers from C language and extend to objects.(L1)
- Identify the need of 'this' pointer.(L1)

UNIT – V

Exception Handling: Introduction, Basics of Exception Handling, Exception Handling Mechanism, Throwing Mechanism, Catching Mechanism, Re-throwing exception, Specifying Exceptions. (10)

Learning Outcomes

By the end of this Unit, the student will be able to

- Compare and contrast Basics of Exception Handling mechanism.(L2)
- Construct programs using Exception Handling Mechanism, Throwing Mechanism, Catching Mechanism, Rethrowing an exception, Specifying Exceptions.(L3)

Text Book:

1.Object Oriented Programming in C++ by E. Balagurusamy, 7th Edition, Tata McGraw Hill Publication, 2017.

Reference Books:

1.Object Oriented Programming with C++ by M.T. Somashekara, D.S. Guru, H.S.Nagendraswamy,
K.S. Manjunatha, PHI Learning, 1st edition, 2012.
2. Mastering C++ by K.R Venugopal, T. Ravishankar, RajKumar, Tata McGraw Hill Publishing Company Limited, 2nd edition,2006.

Course Outcomes:

Upon completion of the course, the student is able to

- Demonstrate of classes and objects.(L2)
- Discuss the concepts of inheritance and polymorphism.(L6)
- Develop constructors and destructors, friend function.(L6)
- Discuss overloading of operators in C++.(L6)
- Distinguish function overloading and function overriding.(L4)
- Explain exception handling in object-oriented programs.(L5)

CSCI 1081 : INTRODUCTION TO OPERATING SYSTEMS

Hours per week:4 End Examination: 30Marks

Credits:4 Sessionals: 70Marks

Preamble: Operating system illustrates abstractions, mechanisms and their implementations. It contains threads, synchronization, inter process communication, Scheduling algorithms, deadlock, memory management, virtual memory, and file system.

Course Objectives:

- To learn the fundamentals of operating systems.
- To understand of mechanisms of OS to handle processes and threads and their communication.
- To ability to learn the mechanisms involved in memory management.
- To gain knowledge on distributed operating system concepts that includes architecture, Mutual exclusion algorithms, deadlock detection algorithms and agreement protocol.
- To know the components and management aspects of concurrency management.
- To lean File system concepts.

UNIT –I

Introduction: What operating system does? Computer – System Architecture, Operating System structure, Operating System Operations, Distributed Systems, Special-purpose Systems, Computing Environments.

System Structures: Operating System Services, User Operating System Interface, System Calls, Types of System Calls, System Programs, OS Design and Implementation. (10)

Learning Outcomes:

By the end of this Unit, the student will be able to

- Describe basic concepts of operating system.(L2)
- List the operating system structure and operations.(L1)
- Define distributed operating system.(L1)
- List the operating system services.(L1)
- Define type of system calls and system programs.(L1)
- List the OS Design and implementation.(L1)

UNIT – II

Process Management: Process Concept, Process Scheduling, Operations On Processes, Inter Process Communication.

Process Scheduling: Basic concepts, Scheduling criteria, Scheduling algorithms. (10)

Learning Outcomes:

By the end of this Unit, the student will be able to

- Illustrate the process concept and scheduling.(L3)
- Use of inter process communication.(L3)
- List the Scheduling criteria and algorithms.(L1)

UNIT – III

Process Synchronization: Background, Critical Section Problem, Peterson's Solution, Classic Problems of Synchronization.

Deadlock: System Model, Deadlock Characterization, Methods for Handling Deadlock, Deadlock Prevention, Avoidance and Detection, Recovery from Deadlock. (10)

Learning Outcomes:

By the end of this Unit, the student will be able to

- Illustrate Critical Section Problem and Peterson's Solution. (L3)
- List the Classic problems of Synchronization.(L1)

- Apply System model and Deadlock methods.(L3)

UNIT - IV

Memory Management: Memory Management Strategies, Background, Swapping, Contiguous, Memory allocation, Paging, Structure of the page table, Segmentation.

Virtual memory: Background, Demand paging, Page replacement, Allocation of frames, Thrashing, other considerations. (10)

Learning Outcomes

By the end of this Unit, the student will be able to

- Apply Memory Management Strategies.(L3)
- Illustrate Virtual memory.(L3)
- List the page replacement and thrashing.(L1)

UNIT – V

File System: File concept, Access Methods, Directory and Disk Structure, File-System Mounting, File Sharing. (10)

Learning Outcomes

By the end of this Unit, the student will be able to

- Illustrate File concept.(L3)
- Apply Access Methods.(L3)
- Use the Directory and Disk structure.(L3)
- List the File System, Mounting, File sharing.(L1)

Text Book:

1. Operating System Concepts by Abraham Silberschatz, Peter B. Galvin and Greg Gagne, Wiley India Publication, 8th edition, Reprint 2012.

Reference Books:

1. Operating Systems: Internals and Design Principles by Stalling William, Prentice Hall,7th edition, 2011.
2. Operating System by Dietel, Pearson Education, 3rd edition,2004.
3. Modern Operating Systems by A.S. Tanenbaum, Prentice Hall, 3rd edition,2007.

Course Outcomes:

Upon completion of the course, the student is able to

- Explain the concepts, structure and design of operating Systems.(L2)
- Design of operating system and its impact on application system design and performance. (L6)
- Demonstrate competence in recognizing and using operating system features.(L2)
- Explain analyses theory and implementation of: processes, resource control(concurrency etc.), physical and virtual memory, scheduling, I/O and files.(L2)
- Discuss paging performance, demand paging and page replacement.(L6)

CSCI 1101: WEB TECHNOLOGIES LAB

Hours per week: 2 Continuous Evaluation:**: 100 Marks**
Credits: 1

Objectives: To learn the basics in web designing using HTML, CSS, and Java Script

1. Write a HTML document to demonstrate Formatting tags.
2. HTML document to demonstrate Ordered lists, unordered Lists, definition Lists.
3. Write an HTML document to create table header rows, data rows, caption and attributes of the table tag.
4. Write an HTML document to cell padding and cell spacing, Bgcolor, Colspan and Rowspan attribute.
5. Write an HTML document using frameset and the targeting named frames.
6. Create Style Sheet and implement the following:
    - CSS Styling(Background, Text Format, Controlling Fonts),Working with block elements and objects, Working with Lists and Tables , CSS Id and , Box Model(Introduction, Border properties, Padding Properties, Margin properties)
    - CSS Advanced(Grouping, Dimension, Display, Positioning, Floating, Align, Pseudo class, Navigation Bar, Image Sprites, Attribute sector)
    - CSS Color, Creating page Layout and Site Designs.
7. Write a JavaScript to demonstrate different data types.
8. Write a JavaScript to demonstrate different operators.
9. Write a JavaScript to demonstrate for loop and while loop.
10. Write a JavaScript to demonstrate arrays.
11. Write a JavaScript to demonstrate dialog boxes.
12. Write a JavaScript to demonstrate user defined functions.
13. Write a JavaScript to demonstrate built-in functions.
14. Write a JavaScript to create login application using form elements.

Reference Books:

1. Complete Reference HTML by T. A. Powell, 3rd edition, TMH,2003.
2. HTML, XHTML, and CSS Bible by Steven M. Schafer, Wiley India, 5th Edition.
3. Beginning CSS: Cascading Style Sheets for Web Design by Ian Pouncey, Richard York, Wiley India.
4. Web Technology and Design by Xavier, C, New Age International,2013.

Course Outcomes:

Upon completion of the course, the student is able to

- Develop a webpage by the use of HTML tags .(L6)
- Develop a dynamic webpage by the use of DHTML and javascript.(L6)
- Construct to write various features of Java Script.(L6)
- Design a server side java applications.(L6)

CSCI1121: PROGRAMMING WITH C++ LAB

Hours per week: 2 Continuous Evaluation:100 marks
Credits: 1

Objectives: To make the students to understand the features of object oriented principles and familiarize them with virtual functions, templates and exception handling. Be able to write a C++ program to solve a well specified problem.

1. Write a program that contains a function to exchange (swap) values of two arguments by using pointers and References parameters.
2. Write a program to check the given string is palindrome or not using a private member function.
3. Write a program to Demonstrate Inline Function.
4. Write a program to add corresponding elements of two 2-D matrices using friend function. Create two classes each capable of storing one 2-D matrix. Declare the matrices under private access specifier and access them outside the class.
5. Write a program for finding area of different geometric shapes (Circle, Rectangle and Cube) using function overloading.
6. Write a Program to generate Fibonacci Series by using Constructor to initialize the Data Members.
7. Write a program to demonstrate a copy constructor.
8. Write a Program to demonstrate Constructors in derived class using friend function.
9. Write a program to demonstrate single inheritance distinguishing public and private derivation.
10. Write a program to illustrate the implementation of both Multilevel and Multiple (Hybrid) inheritance.
11. Write a program to reverse of a string using operators.
12. Write a program to find transpose of a given matrix of mxn size using unary operator overloading.
13. Write a program to add two matrices of mxn size using binary operator overloading.
14. Write a program to demonstrate the usage of virtual functions.
15. Write a program to find average marks of the subjects of a student. Throw multiple exceptions and define multiple catch statements to handle division by zero as well as array index out of bounds exceptions.

Reference Book:

1. Object Oriented Programming in C++ by E. Balaguruswamy, 4rd Edition, Tata McGraw Hill Publication.

2 .Let Us C++ by Yashavant P.Kanetkar,2ndEdition, BPB Publications,

Course Outcomes:

Upon completion of the course, the student is able to

- Demonstrate of classes and objects.(L2)
- Develop the concepts of inheritance and polymorphism.(L6)
- Develop constructors and destructors, friend function.(L6)
- Implement Operator overloading, Virtual functions, Exception Handling.(L6)

CSCI2001 ELEMENTARY DATA STRUCTURES USING C++

Hours per week:4 End Examination:30Marks

Credits:4 Sessionals:70Marks

Preamble :

C++ is one of the most popular languages, contains object-orientation, Data Structures Using C++most popular. This course helps in developing data structures and algorithms in real time applications like arrays, stacks, queues, linked lists, trees and graphs.

Course Objective:

- To understand the linear and non linear data structures available in solving problems.
- To know about the sorting and searching techniques and its efficiencies.
- Usage of the data structures and algorithms in real time applications and ability to design their own data structure according to the application need.
- To understand about stacks, queues, linked lists, trees and graphs.

UNIT - I

Fundamental Concepts: Introduction to Data Structures, Types of Data Structures, and Implementation of data structures, Analysis of Algorithms.

Complexity of algorithms: Space complexity, Time complexity.

Linear Data Structure Using Arrays: Sequential Organization, Linear Data Structure.

Using Sequential Organization: Arrays, Array as an Abstract Data Type, Memory Representation and Address Calculation, The Class Array, Inserting an element into an array, Deleting an element, Pros and Cons of Arrays, Applications of arrays, Sparse Matrix. (7)

Learning Outcomes:

By the end of this Unit, the student will be able to

- Describe the basic concepts of Data Structures.(L2)
- Choose appropriate algorithms of Complexity.(L3)
- Use Linear array.(L3).
- Outline the Applications of arrays and Sparse Matrix.(L2)

UNIT - II

Stacks: Primitive operations, Stack Abstract Data Type, Representation of Stacks Using Sequential Organization (Arrays), Applications of Stack, Expression Evaluation and Conversion Polish notation and expression.

Queues: Concept of Queues, Queue as Abstract Data Type, Realization of Queues Using Arrays, Circular Queue, Advantages of using circular queues, Array implementation of priority queue. (12)

Learning Outcomes:

By the end of this Unit, the student will be able to

- List the difference between Stacks and Queues.(L1).
- Develop Applications of Arrays and Stacks(Polish notations).(L3).
- Apply Circular queue and advantages of using circular queues.(L3).
- Describe Array implementation of priority queue.(L2).

UNIT - III

Linked Lists: Introduction, Linked List, Comparison of sequential and linked organizations, Linked list terminology, Primitive operations, Realization of Linked Lists using arrays, Linked list using dynamic memory management .

Linked List Abstract Data Type: Data structure of node, Insertion of a node, Linked list traversal, Deletion of a node, Types of linked list, Linear and Circular linked lists, Linked Stack, Linked Queues **.** (10)

Learning Outcomes:

By the end of this Unit, the student will be able to

- Describe Linked List.(L2)
- Apply Primitive operations.(L3)
- Use Linked list using dynamic memory management.(L3)
- Outline the Circular linked list, Linked stack and Linked Queues.(L2)

UNIT - IV

Trees: Introduction, Basic terminology, Types of Trees, Binary Tree, Properties of a binary tree, Binary Tree Abstract Data Type, Array implementation of binary trees, Linked implementation of binary trees, Binary Tree Traversal, Conversion of General Tree to Binary Tree.

Binary Search Tree: Basic Concepts, Traversals, Creation, Insertion, Deletion of binary search trees. (8)

Learning Outcomes:

By the end of this Unit, the student will be able to

- Explain the need of Trees.(L2)
- Describe the basic concepts Binary Search Tree.(L2)
- Use traversals, Creation, Insertion, Deletion of binary search trees.(L3)

UNIT - V

Graphs: Introduction, ADT of Graph, Representation of Graph, Graph Traversal, Spanning Trees.

Searching: Search Techniques, Sequential Search, Binary search.

Sorting: Types of sorting, General sort concepts, Bubble sort, Insertion sort, Selection sort Quick sort (8)

Learning Outcomes:

By the end of this Unit, the student will be able to

- Describe the Graphs.(L2)
- Explain the need of search Techniques.(L2)
- Use sorting types.(L3)

Text Book:

1. Data Structures using C++ by VarshaH.Patil, Oxford University Press, New edition, 2012.

Reference Books:

1.Fundamentals of Data Structures in C++ by Ellis Horowitz, Sartaj Sahni Anderson, Freed, 2nd edition 2008.

2. Data Structures using C++ by D.S.Malik, Cenage Learning, 2nd edition,2009.

Course Outcomes:

Upon completion of the course, the student is able to

- Describe knowledge of basic data structures of Arrays, Sequential organizations(L6)
- Develop knowledge of various operations of Stacks, Queues (L6)
- Develop knowledge of various operations Linked Lists(L6)
- Describe knowledge of various operations on Tress and Graphs(L1)
- Describe knowledge of various sorting and Searching techniques (L6)

CSCI2011 DATA STRUCTURES USING C++ LAB

Hours per week: 2 **Continuous Evaluation: 100 Marks**
Credits: 1

Objective: To develop skills to design and analyze simple linear and non linear data structures and identify the appropriate data structure for the given problem and to write and execute programs in C++.

1. Implementation of Array Operations.
2. Implementation of Sparse Matrix Addition, Multiplications.
3. Array implementation of stack.
4. Array implementation of Queue.
5. Implementation of circular queue ADT using an array.
6. Implementation of conversion of expressions.
7. Implementation of Postfix Expression Evaluation.
8. Implementation of Singly Linked List operations, insertion, deletion, display, reverse.
9. Implementation of Linked Stack Operations.
10. Implementation of Linked Queue Operations.
11. Implementation of Binary Search Tree Creation, Traversals.
12. Implementation of Graph Traversals.
13. Implementation of Linear Search, Binary Search.
14. Implementing the following sorting methods.
    a. Bubble sort
    b. Insertion sort
    c. Selection Sort
    d. Quick sort

References Books:

1. Data Structures with C++ by John R. Hubbard, TMH, 1st edition,2004.
2. Data Structures using C& C++ by Rajesh K Shukla, Wiley Publications,2009.
3. Data Structures using C++ by Varsha H Patil, Oxford University Press, New edition,2012.

Course Outcomes:

Upon completion of the course, the student is able to

- Able to develop and implementation of Array operations.(L3)
- Examine the working of Spares Matrix Addition, Multiplications, conversion expression (L4).
- Able to develop and implement Stack, queue, circular queue,(L3)
- Understand various linked list operations.(L2)
- List the concepts of Binary Search Tree Traversals, Graph Traversals, Linear Search, Binary Search able develop applications. (L4)
- Understand sorting methods Bubble sort , Insertion sort, Selection sort, Quick sort.(L2)

CSCI2021 INTRODUCTION TO UNIX PROGRAMMING

Hours per week:4 End Examination:30Marks

Credits:4 Sessionals:70Marks

Preamble :

Unix is popular multi user operating system in the world. We learn unix tools and concepts. We can write shell programming in Unix programming languages. It is aimed to give security of files and directories of Unix operating system.

Course Objectives:

- To make the student to learn ownership and permissions of the files and directories.
- To train the student to acquaint about Vi- a standard Unix text editor.
- To make the student to write shell script programs.
- To enable the student on how to give the security of Unix files and directories through login and password.

UNIT - I

Getting started: The operating system-The Unix operating system-knowing your machine-knowing your machine-briefing session.

The Unix architecture and command usage: Unix architecture-features of Unix-Locating commands-Internal and external commands-command structure. (10)

Learning Outcomes:

By the end of this Unit, the student will be able to

- Describe unix operating system and machine-briefing session.(L2)
- Illustrate the Unix architecture.(L3)
- Use internal and external commands.(L3).

UNIT - II

General-purpose utilities- cal, date, echo, printf, bc, passwd, who, tty.

The file system: Filename, The parent-child relationship, The Home Directory, pwd, cd, mkdir, rmdir, ls-Absolute Pathnames-Relative Pathnames, ls-The UNIX file System. (10)

Learning Outcomes:

By the end of this Unit, the student will be able to

- Use cal and other commands in Unix.(L3)
- Describe file system in Unix.(L2)
- Illustrate parth name, relative pathnames and Unix file systems.(L3)

UNIT – III

Handling ordinary files: cat, cp, rm, mv, more, lp, file, wc, od, cmp, comm., diff,zip and unzip. **Basic file attributes**: ls –l, chmod, Directory Permissions, Changing file ownership. (10)

Learning Outcomes:

By the end of this Unit, the student will be able to

- Describe ordinary files.(L2)
- Identify the need of diff, zip and unzip commands in Unix.(L1)
- Illustrate Basic file attributes in Unix.(L3)

UNIT – IV

The vi Editor: vi Basics-Input Mode-Entering and Replacing Text-Saving Test and quitting-Editing Text.

The Shell: The shell's Interpretive Cycle-Shell Offerings-Pattern Matching-The wild-cards-Escaping and Quoting-Redirection-Pipes-tee-Command substitution-Shell Variables.

The Shell: The shell's Interpretive Cycle-Shell Offerings, Pattern Matching-The Wild-cards-Escaping and Quoting-Redirection-Pipes-tee-Command Substitution-Shell variables.

More file attributes: file systems and Inodes-Hrd links-Symbolic Links and ln-The Directory-find.

Simple Filters: head, tail, cut, paste, sort, uniq ,tr.

Filter using regular expressions :grep-sed. (10)

Learning Outcomes:

By the end of this Unit, the student will be able to

- Use vi Editor and other editors in UNIX.(L3)
- Explain the need of the shell, redirection, pipes, tee and other commands inUnix.(L2)
- Describe file system, links, Directory, find.(L2)
- Identify the need head, tail, cut, paste, sort, uniq, tr, grep, sed commands inUnix.(L1)

UNIT – V

Essential Shell Programming: Shell Scripts, read-The if Conditional-The case Conditional-the case Conditional-expr-while looping-for looping. (10)

Learning Outcomes:

By the end of this Unit, the student will be able to

- Construct programs using Shell Script.(L3)
- Use read ,if ,case statements in Unix.(L3)
- Describe while, for looping in Unix.(L2)

Text Book:

1. Unix Concepts and Applications by Sumitabha Das, McGrawHill , 4th Edition, 2014.

Reference Book:

1. UNIX Concepts and Programming by Murugan Sethuraman, Denet and Company,2006.

Course Outcomes:

Upon completion of the course, the student is able to

- Learn the concepts, design, structure, features of the UNIX operating system.(L5)
- Learn the basic UNIX Utilities.(L5)
- Learn the shell script commands.(L5)
- Learn and write UNIX shell script programming.(L5)

CSCI2031UNIX PROGRAMMING LAB

Hours per week: 2 **Continuous Evaluation: 100 Marks**
Credits: 1

Objective: To give an overview of the UNIX Operating System, its Architecture, Directory Structure and Command Usage.

1. Practice the commands encountered in the syllabus.
2. Write a shell script to compare two strings.
3. Write a shell script to find the length of the strings.
4. The marks obtained by a student in 5 different subjects are input through the keyboard. The student gets a rank as per the following rules: Percentage above or equal to 60, First Rank Percentage above 50 and 59, Second Rank, Percentage above 40 and 49, Third Rank, Percentage less than 40, Fail. P
5. Write a shell script to display file permissions along with their names.
6. Write a shell script to prints date, no of users and personal status.
7. Write a shell script which accepts a number and displays the list of even numbers from given numbers.
8. Write a shell script that prints out date information in this order: TIME, DAY OF WEEK, DAY NUMBER, MONTH, YEAR Like 20:10:42 Mon 29 Jun2015.
9. Write a shell script to display the following details in a pays lip.
   Pay slip Details: 1. House Rent Allowance, 2. Dearness Allowance, 3. Provident Fund
10. Write a shell script to reverse the digit.
11. Write a program to check whether a given number is even or odd.
12. Program to generate Fibonacci series up to N.

Reference Books:

1. Unix Concepts and Programming by Murugan Sethuraman, Denet and Company,2006.
2. Unix Concepts by Sumitaba Das, TMH Publications, 4th edition,2006.

Course Outcomes:

Upon completion of the course, the student is able to

- Able to develop and understand Unix commands.(L3)
- Understand various Unix commands.(L2)
- Able to develop and implement shell script programs.(L3)
- Construct applications using control structure and shell commands.(L6)

CSCI2041 PRINCIPLES OF SOFTWARE ENGINEERING

Hours per week:4 End Examination:30Marks

Credits:4 Sessionals:70Marks

Preamble: Software engineering is the process of analyzing user needs followed by designing, constructing, and testing end user applications. It is done through the use of software programming languages. It is an application of engineering principles to software development.

Course Objectives

• To enable the student to understand the Software Engineering process models.
• To know about Agile development and Requirements of engineering.
• To Understand about Architectural design, Implementation and testing strategies.

UNIT I

Introduction to software Engineering and Software Process: Introduction to software Engineering: Professional software development, Software Engineering Ethics, Case studies.
Software processes: Software process models, Process activities, coping with change, The rational unified process. (12)

Learning Outcomes: After completion of this unit, the student will be able to

- Describe the basic concepts of Software engineering. (L1)
- Understand the software process activities and its case studies. (L1)
- Understanding the Basic Software Engineering Ethics. (L1)

Pedagogy tools: Scale-up , Lecture , Case study , Industrial visit , NPTEL

UNIT II

Agile software development & Requirements Engineering:
Agile software development: Agile methods, Plan-driven and agile development, Contents, Extreme programming, Agile project management, scaling agile methods.
Requirements Engineering: Functional and non-functional requirements, The software Requirements Document, Requirements specification, Requirements engineering processes, Requirements elicitation & analysis, Requirements validation, Requirements management. (16)

Learning Outcomes: After completion of this unit, the student will be able to

- List the different agile methods where requirements and solutions evolve through collaboration between self-organizing cross-functional teams. (L1)
- List the difference between functional and non-functional requirements. (L1)
- Describe the process of software engineering requirements. (L2)

Pedagogy tools: Scale-up , Lecture , Case study , NPTEL.

UNIT III

System modeling: Context models, Interaction models, Structural models, Behavioural models, Model-driven engineering. (10)

Learning Outcomes: After completion of this unit, the student will be able to

- Understand the context model and Interaction model. (L1)
- Describe the Model driven engineering. (L2)
- Understand the Structural models and Behavioural models. (L1)

Pedagogy tools: Scale-up , Lecture , Case study , NPTEL

UNIT IV

Architectural design : Architectural design decisions, Architectural views, Architectural patterns, Application architectures. (10)

Learning Outcomes: After completion of this unit, the student will be able to

- Describe the Architectural design process with labelled diagram. (L2)
- List the application architectures and its views. (L1)
- Understand the Architectural patterns. (L1)

Pedagogy tools: Scale-up , Lecture , Case study , NPTEL

UNIT V

Design and Implementation: Object-oriented design using the UML, Design patterns, Implementation issues, Open source development.

Software Testing: Software testing, Development testing, Test driven development, Reuse testing, User testing. (12)

Learning Outcomes: After completion of this unit, the student will be able to

- Describe the Design implementation using UML. (L2)
- List the different design patterns and its implementations issues. (L1)
- List the different types of Software testing. (L1)

Pedagogy tools: Scale-up , Lecture , Case study , Industrial visit , NPTEL

Textbook(s):

1. Ian Sommerville,'Software Engineering',ninth,Pearson,india,2011,978-93-325-1885-8,All unites

Additional Reading(s):

1. Roger S Pressman, 'Software Engineering: A Practitioner's Approach ',6th,Tata McGraw Hill, New York,2005, 978–0–07–337597–7,ALL

Course Outcomes (COs):

1. Recognize software process models and applicability
2. Able to implement agile software and development methods.(L3)
3. Able to manage and analyze requirement process.(L3)
4. Able to design the system model using UML modeling.(L3)
5. Able to analyze the system architecture and organizing system architecture for reusability.(L3)
6. Able to implement the system using object-oriented design for the UML, design patterns and evaluate the system.(L3)

CSCI2051 INTRODUCTION TO DATA COMMUNICATIONS AND NETWORKS

Hours per week:4 End Examination:30Marks

Credits:4 Sessionals:70Marks

Preamble:

Data communications and networking may be the fastest growing technologies in our culture today. This course is to provide students with an overview of the basic concepts of Data Communication and fundamentals of computer networks. The course gives knowledge on data communication concepts and techniques in layered network architecture, communications switching and routing, types of communication, network congestion, network topologies, network configuration and management, network model components, layered network models (OSI reference model, TCP/IP networking architecture) and their protocols.

Course Objectives:

- Build an understanding of the fundamental concepts of computer networking.
- Familiarize the student with the basic taxonomy and terminology of the computer networking area.
- Allow the student to gain expertise in some specific areas of networking

UNIT - I

Data Communications, Networks, Network Models- OSI Model, TCP/IP Protocol Suite.

Digital Transmission - Transmission Modes**,** Multiplexing, Transmission Media**.** **(**10)

Learning outcomes:

By the end of the course, the student will be able to:

- Understand the concepts of data communications and networking.(L1)
- Discuss Data communications components, data representation, and data flow.(L1)
- Discuss network topologies, categories of networks, and the general idea behind the Internet. (L1)
- Have an overview of the organizations that set standards in datacommunications and networking.(L1)
- Illustrate the OSI layers, functions and its protocols.(L1)
- Differentiate between OSI model and TCP/IP model. (L1)
- Differentiate parallel and serial transmission.(L1)
- Describe the goals of multiplexing.(L1)
- Brief understanding of the three main multiplexing techniques.(L1)
- Basic understanding of the transmission media-guided and unguided media.(L1)

UNIT - II

Switching-Datagram Networks: Routing Table, Efficiency, Delay, Datagram Networks in the Internet.

Wired LANs: Ethernet, IEEE standards. (8)

Learning outcomes:

By the end of the course, the student will be able to:

- Define Switch.(L1)
- Describe the need for switch.(L1)
- List the three traditional switching methods. What are the most common today.(L1)
- Describe packet –switched network.(L1)
- List four major components of a packet switch and their functions.(L1)
- Briefly discuss the IEEE standard project 802. (L1)
- Explain the categories of standard Ethernet.(L1)

UNIT –III

Error Detection and Correction: types of errors, redundancy, detection versus correction, forward error correction versus re-transmission, CRC, Cheksum.

Flow and Error control, Noisy Channels –stop-and-wait repeat request, go-back-n automatic repeat request, selective repeat automatic repeat request, piggybacking. (10)

Learning outcomes:

By the end of the course, the student will be able to:

- Define Error and different types of errors. (L1)
- Discuss the concept of redundancy in error detection and correction.(L1)
- Distinguish between forward error correction versus error correction by retransmission.(L1)
- Explain Cyclic Redundancy Check.(L1)
- Discuss Checksum - error detection method. (L1)
- Compare and contrast flow control and error control.(L1)
- List the three protocols of noisy channels .(L1)
- Compare and contrast the Go-Back-NARQ Protocol with Selective-Repeat ARQ.(L1)

UNIT – IV

Network Layer:**IPv4 address**-address space, notations, classful addressing, network address translation(NAT),**IPv6 address**-structure, address space **Address Mapping-**mapping logical to physical address -ARP, mapping physical to logical address- RARP,BOOTP and DHCP. (10)

Learning outcomes:

By the end of the course, the student will be able to:

- Define logical address and physical address.(L1)
- What is IP address and the number of bits in an IPv4 address and IPv6 address.(L1)
- What is dotted decimal notation in IPv4 addressing. (L1)
- What are the differences between classful addressing and classless addressing inIPv4.
- List the classes in classful addressing and define the application of each class (unicast multicast, broadcast, or reserve). (L1)
- Change the following IP addresses from dotted-decimal notation to binary notation and vice versa.(L1)
- Briefly discuss the protocols ARP, RARP, BOOTP, DHCP, and IGMP.(L1)
- What is NAT and How can NAT help in address depletion.(L1)

UNIT - V

Transport layer: connectionless versus connection-oriented services, reliable versus unreliable, three protocols, User Datagram Protocol(UDP)-well-known ports for UDP, user datagram, checksum, UDP operation, use of UDP,TCP-TCP services, TCP features, segment.

Application Layer: Domain Name System. Name Space, Distribution of Name Space, DNS in the Internet, Resolution. (10)

Learning outcomes:

By the end of the course, the student will be able to:

- Understand Process to process delivery.(L1)
- Differentiate connectionless versus connection-oriented services and reliable versus unreliable.(L1)
- Compare the TCP header and the UDP header.(L1)
- What is DNS?(L1)
- Advantage of a hierarchical name space over a flat name space for a system the size of the Internet.(L1)
- What are the three domains of the domain name space.(L1)
- How does recursive resolution differ from iterative resolution?(L1)

Text Book:

1. Data Communication and Networking by Behrouz A Forouzan, Tata McGraw Hill, 4th edition, 5th reprint, 2007.

Reference Books:

1. Data and Computer Communications by William Stallings, Pearson Publications, 9th edition, 2011.
2. Data Communication and Computer Networks by Ajit Pal, PHI Learning 1st edition,2013.

Course Outcomes:

Upon completion of the course, the student is able to

- Explain computer networks and the Internet.(L2)
- Able to differentiate among and discuss the four levels of addresses (physical, logical port, and specific used by the Internet TCP/Protocols.(L3)
- compare and contrast the data transmission modes: serial and parallel as well as synchronous, asynchronous, and isochronous with relevant examples.(L5)
- Identity types of bit errors and explain the concept of bit redundancy.(L3)
- List internetworking principles and how Internet protocols IP, IPv4 and IPv6 operate.(L1)
- List the concept of reliable and unreliable transfer protocol of data and how TCP and UDP.(L1)
- List Application Layer Services.(L1)

CSCI2061 INTRODUCTION TO DATABASE MANAGEMENT SYSTEMS

Hours per week:4 End Examination:30Marks

Credits:4 Sessionals:70Marks

Preamble:

A database management system (DBMS) is system software for creating and managing databases. It provides users and programmers with a systematic way to create, retrieve, update and manage data.

Course Objectives:

- To study in detail about the Fundamentals of Database Management Systems, Various applications of DBMS**.**
- To understand the Entity-Relationship modeling, SQL, Data Normalization and Database design.
- To know about the Database Architecture and design models.

UNIT - I

Introduction: Database-Systems Applications, Purpose of Database Systems, View of Data, Database Languages, Relational Databases, Database Design, Object based and Semi structured Databases, Data Storage and Querying, Transaction Management, Data Mining and Analysis, Database Architecture, Database Users and Administrators, History of Database Systems. (10)

Learning Outcomes: By the end of this unit, the student will be able to

- Discuss the purpose of Database system and its applications.(L6)
- List the different Database languages.(L1)
- Outline the Database architecture and also explains about RDBMS.(L2)

UNIT - II

Relational Model: Structure of Relational Databases, Fundamental Relational Algebra Operations, Additional Relational Algebra operations, Extended Relational Algebra operations, Null Values, Modification of the Database. (12)

Learning Outcomes: By the end of this unit, the student will be able to

- Discuss the structure of Relational Databases (L6)
- List the different operations of relational models and Null values.(L1)

UNIT - III

SQL: Data Definition, Basic Structure of SQL Queries, Set Operations, Aggregate Functions, Null Values, Nested Sub queries, Complex Queries, Views, Modification of the Database, Joined Relations. (10)

Learning Outcomes: By the end of this unit, the student will be able to

- List the different SQL queries.(L1).
- Discuss the different set of operations and its functions.(L6)
- List some complex queries and views.(L1)

UNIT - IV

Database Design and E-R Model: Entity-Relationship Model, Constraints, Entity Relationship Diagrams, Entity-Relationship Design Issues, Weak Entity Sets, Extended E-R Features, Database Design for Banking Enterprise, Reduction to Relational Schem as, UML. (8)

Learning Outcomes: By the end of this unit, the student will be ableto

- Discuss the ER models with labeled diagrams by taking some examples.(L6)
- List the different ER features and its constraints.(L1)
- Outline the Database design.(L2)

UNIT - V

Relational Database Design: Features of Good Relational Design, Atomic Domains and normalization, 1NF, 2NF, 3NF, BCNF, Decomposition using Functional Dependencies, Functional

Dependency Theory, Decomposition Using Functional Dependencies, Decomposition Using Multi- Valued Dependencies, more Normal Form and Database Design Process & Modeling Temporal Data. (10)

Learning Outcomes: By the end of this unit, the student will be able to

- List the different features of RDBMS.(L1)
- Analyze the different types of Normal Forms.(L4)
- Discuss the different functional dependencies using different techniques.(L6)

Text Books:

1. Database System Concepts by Henry F.Korth and S.Sundarshan, MC Graw Hill Higher Education, 5th edition, 2006.

Reference Books:

1. Database Management Systems by Raghurama Krishnan and James Gerhke, MC Graw Hill Higher Education, 3rd edition.
2. Fundamentals of Database Systems by Elmasri Navathe, Sixth edition, Addison-Wesley,2011.

Course Outcomes:

Upon completion of the course, the student is able to

- Explain the Fundamentals of Database Management Systems, Various applications of DBMS.(L2)
- Discuss the Entity-Relationship modeling, SQL, Data Normalization and Database design. (L6)
- Discuss the Database Architecture and design models.(L6)

CSCI2071 DATABASE MANAGEMENT SYSTEMS LAB

Hours per week: 2 **Continuous Evaluation: 100 Marks**
Credits: 1

Objectives: To give a formal foundation on the relational model of data and to give an introduction to systematic database design approaches covering conceptual design, logical design and an overview of physical design

1. To implement Data Definition language commands using Create, Alter, Drop, Truncate
2. To implement DML, TCL and DRL commands
   (a) Insert (b)Select (c)Update (d)Delete
   (e)Commit (f)Rollback (g) Savepoint (h)
Like'%' 3.To implement Constraints.
   (a)Primary key (b)Foreign Key (c)Check (d)Unique (e) Null
   (f)Not Null (g) Drop Constraints
4. To implement Nested Queries & Join Queries
5. PL/SQL programs to implement
   (a) Addition of Two Numbers (b) IF Condition
   (c) Greatest of three numbers using IF ANDELSEIF
   (d) Summation of odd numbers using for LOOP (e) GCD Numbers
6. Implementation of Implicit and Explicit Cursors
7. Demonstration of triggers

Reference Books:

1. Introduction to Relational Databases and SQL Programming by Christopher Allen, Simon Chatwin, Catherine A. Vreary, TataMcGraw-Hill.
2. Databse Management System a Practical Approach by Rajiv Chopra, S.Chand, Fourth revised edition, 2010.

Course Outcomes:

Upon completion of the course, the student is able to

- To implement Create, insert, select commands on the database. (L2)
- Demonstrate the working of different concepts of DBMS (L3)
- Implement, analyze and evaluate the project developed for an application.(L3)
- Design and implement database scheme for a given problem–domain.(L4)
- Normalize a database(L4)

CSCI2081 INTRODUCTION TO JAVA PROGRAMMING

Hours per week:4 End Examination:30Marks

Credits:4 Sessionals:70Marks

Preamble:

Java is a popular general-purpose programming language and computing platform which fast, reliable, and secure. This course helps in developing classes, objects and also different packages in Java. It also helpful in creating a programmer's API for Java semantic web applications.

Course Objectives:

- To cover preliminaries and make the students learn how to program in basic concepts.
- To understand packages, Interfaces, threads. Exception Handling, String Handling, Applets in Java allows the students to implement effectively.

UNIT – I

The Primaries and Control Statements: Introduction to Java, Features of Java, Object Oriented Concepts, Lexical Issues, Data Types, Variables, Arrays, Operators, Control Statements. (8)

Learning Outcomes: By the end of this unit, the student will be able to

- List the java buzzwords.(L4)
- Discuss the different types of data types and operators.(L6)
- Outline of the control statements.(L2)

Pedagogy tools:
Self-reading , Video , Lecture , Practical , Blended Learning , Flipped class , NPTEL

UNIT – II

Classes and Objects: Classes, Objects, Constructors, Overloading methods, Overloading Constructors, Using Objects as Parameters, Understanding static, Introducing Inner Classes, Inheritance, Overriding methods, Dynamic Method Dispatch, Abstract class. (10)

Learning Outcomes: By the end of this unit, the student will be able to

- Discuss the constructors and destructors.(L6)
- Elaborate different types overloading methods and its parameters.(L6)
- Explain the concept of compile time polymorphism and Abstract class.(L2)

Pedagogy tools:
Self-reading , Video , Lecture , Practical , Blended Learning , Flipped class , NPTEL

UNIT – III

Packages, Interfaces and Exception Handling: Packages, Access Protection, Importing Packages, Interfaces, Exception Handling, Throw and Throws finally. (8)

Learning Outcomes: By the end of this unit, the student will be ableto

- Outline of packages and Interfaces.(L2)
- Discuss the import of packages.(L6)
- List the exception handling events.(L1)

Pedagogy tools:
Self-reading , Video , Lecture , Practical , Blended Learning , Flipped class , NPTEL

UNIT –IV

Multithreaded Programming: The Java Thread Model , Main Thread, Creating Thread, Extending Thread, Creating Multiple Threads , Using is Alive() and join(),Thread Priorities.(9)

Learning Outcomes: By the end of this unit, the student will be able to

- Discuss the Multithread concepts.(L6)
- List the creating and extending thread views.(L1)
- Explain the concepts of Thread methods like is Alive() and Join().(L2)

Pedagogy tools:
Self-reading , Video , Lecture , Practical , Blended Learning , Flipped class , NPTEL

UNIT – V

Applets: Applet Basics, Applet Architecture, Applet Skeleton, Simple Applet display methods, Requesting Repainting, Simple Banner Applet, HTML Applet Tag.
Event Handling: Two Event Handling Mechanisms, Event Classes, Event Listener Interfaces, Adapter Classes. (9)
Learning Outcomes: By the end of this unit, the student will be able to

- Discuss the concept of Applet Architecture.(L6)
- List the different Applet methods.(L1)
- Discuss the Event handling mechanism.(L6)

Pedagogy tools:
Self-reading , Video , Lecture , Practical , Blended Learning , Flipped class , NPTEL

Text Book:

1.The Complete Reference Java2 by Herbert Schildt, TMH, 5th edition, 2009.

Reference Books:

1. The Java Programming Language by K. Arnold and J. Gosling, Pearson Education, 3rd edition, 2005.
2. Java in a Nutshell: A Desktop Quick Reference for Java Programming by DavidFlanagan, Rammers, O'Reilly and Associates Inc. 1999.
3. Thinking in Java by Bruce Eckel, Prentice Hall, 2nd edition,2002.

Course Outcomes:

Upon completion of the course, the student is able to

- To demonstrate data types and control statements (L2)
- To develop class and objects and constructors(L6)
- To explain packages and threading concepts(L2)
- To explain about applets and event handling(L2)

CSCI2091 JAVA PROGRAMMING LAB

Hours per week: 2 **Continuous Evaluation: 100 Marks**
Credits: 1

Objectives: To make the student to understand fundamentals of programming such as variables, conditional and iterative execution, methods, etc. and to enable the student to define classes, invoke methods and using class libraries, etc.

1. Implement a Java Program that reads a line of integers, and then displays each integer, and the sum of all the integers (Use String Tokenizer class of java.util)
2. Write a Java program to illustrate the concept of class with method overloading.
3. Demonstrate a Java program and apply the concept of Single level and Multi level Inheritance.
4. Write a Java program to illustrate the concept of Dynamic Polymorphism.
5. Demonstrate a Java program to execute Interfaces &Abstract Classes.
6. Write a Java program to implement the concept of exception handling.
7. Illustrate the concept of threading using Thread Class and runnable Interface.
8. Demonstrate the concept of multi-threading that creates three threads. First thread displays "Good Morning" every one second, the second thread displays "Hello" every two seconds and the third thread displays "Welcome" every three seconds.
9. Implement the serialization concept
10. Write a Java program to illustrate the concept of Thread synchronization.

Reference Books:

1. The Complete Reference Java2 by Herbert Schildt, TMH 5th edition,2009.
2. Java How to program by Paul Deitel, Harvey Deitel, Pearson, 10th edition,2016.

Course Outcomes:

Upon completion of the course, the student is able to

- An ability to analyze a problem and identify and define the computing requirements appropriate for its solution under given constraints.(L2)
- Describe the Multithreading programming concepts.(L2)
- An ability to perform experiments to analyze and interpret data for different applications of exception handling.(L2)
- Understand OOP concepts and basics of Java programming.(L1)
- Create Java programs using inheritance and polymorphism and Implement error-handling techniques using exception handling and multithreading.(L3)
- To differentiate various collections, build files and establish database connection. To develop GUI using Swing components.(L3)

CSCI2121 ADVANCED PYTHON PROGRAMMING LAB

Hours per week: 2 **Continuous Evaluation: 100 Marks**
Credits: 1

Objective: To write, test, and debug advanced Python programs. To implement Python programs based on searching and sorting algorithms. Use functions for structuring Python programs. Write programs using concepts such as lambda, OOPs concepts, data frames.

1 Write a program add.py that takes 2 numbers as command line arguments and prints its sum .

2 Write function to computegcd,lcm of two numbers.

3 To write a python program Binary search

4 Write a program to implement Selection sort

5 Write a program to implement Insertion Sort

6 Write a function cumulative_sum to compute cumulative sum o a list of numbers.

7 Write a program to perform addition of two square matrices

8 Write a program to double a given number and add two numbers using lambda()

9 Write a python program which accepts the radiu so far circle
From user and computes the area(use math module).

10 Write a program to find sum of two numbers using class and methods

11 Using a numpy module create an array and check the following:
a)Type of array b)Dimensions of array c)Shape of array d)Type of elements in array

12 Writeapythonprogramtoconcatenatethedataframeswithtwodifferentobjects

13 WriteapythonprogramtodefineamoduleandimportaSpecificfunctioninthatmoduletoanotherprogram.

14 Write a python program to illustrate the concept of polymorphism in python

15 Write a python code to set background color and pic and draw
A square and fill the color using turtle module

Course Outcome

1 To build the basic concepts of python programming like functions, modules(L3)
2 To build searching, sorting and merging algorithms(L3)
3 To build the concepts data frames(L3)
4 To build concepts of packages(L3)
5 To build concepts of OOPS(L3)

CSCI3001 OBJECT ORIENTED ANALYSIS AND DESIGN

Hours per week: 4 End Examination: 60Marks

Credits:4 Sessionals: 40Marks

Preamble :

Object oriented analysis and design is one is a popular technical approach for analyzing and designing an application, system, or business by applying object-oriented programming, as well as using visual modeling throughout the development life cycles to foster better stakeholder communication and product quality. This course also helps in developing is to improve the quality and productivity of system analysis and design by making it more usable. In analysis phase, OO models are used to fill the gap between problem and solution.

Course Objectives:

- To create a requirements model using UML class notations and symbols,
- To create use-cases based on statements of user requirements, and to analyze requirements models given to them for correctness and quality.
- To construct the Object Oriented Analysis and design of a system from the requirements model in terms of a high-level architecture description, and low-level models of structural organization and dynamic behavior using UML class, object, and sequence diagrams.
- To build the nature of design patterns by understanding a small number of examples from different pattern categories, and to be able to apply these patterns in creating an OOdesign.
- To analyze OO design heuristics, patterns or published guidance, evaluate a design for applicability, reasonableness, and relation to other design criteria

UNIT - I

System Development (Introduction):

An Overview of Object-Oriented Systems Development: Orthogonal View of the software, Object-Oriented Systems Development Methodology, Why an Object Orientation.

Object Basics: Objects Are Grouped in Classes, Attributes, Object Behavior and methods, Objects Respond to Messages, Encapsulation, Class Hierarchy, Polymorphism, Object Relationships and Associations, Aggregations and Object Containment, Advanced Topics.

System Development Life Cycle: Software Development Process, High-Quality Systems, Object-Oriented Systems Development, Reusability. (12)

Learning Outcomes:

By the end of this Unit, the student will be able to

- Analyze what for Object Oriented Analysis is needed? (L2)
- Describe the basic concepts of objects.(L2)
- Explain the need of Development LifeCycle.(L2)

UNIT – II

Object-Oriented Methodologies: Introduction, Rumbaugh et al.'s Object Modeling Technique, The Booch Methodology, The Jacobson et al. Methodologies, Patterns, Frameworks, Unified Approach.

Unified Modeling Language: Static and Dynamic Models, Introduction to the Unified Modeling Language, UML diagram, UML Class Diagram, Use-Case Diagram, UML Dynamic Modeling, Model Management, UML Extensibility, UML Meta-Model. **(12)**

Learning Outcomes:

By the end of this Unit, the student will be able to

- Describe the various methodologies.(L2)
- Explain the need of various Patterns, Frame works.(L2)
- Outline the Unified Approach ,UML.(L2)
- Describe Why modeling is required.(L2)

- Illustrate the varies object relations , Attributes.(L3)
- Explain the concept of methods and development of classes.(L2)
- Describe the various UML diagrammatic representations.(L2)
- Illustrate case studies to design UML diagram.(L3)

UNIT - III

Object-Oriented Analysis Process: Identifying use cases – Introduction, Why Analysis is a difficult Activity, Business Object Analysis, Use-Case Driven Object Analysis, Business Process Modeling, Use-Case Model, Developing Effective Documentation, Case Study.
Object Analysis – Classification: Classifications Theory, Approaches of Identifying Classes, Noun Phrase Approach, Common Class Patterns Approach, Classes, Responsibilities and collaborators, naming classes. (12)

Learning Outcomes:

By the end of this Unit, the student will be able to

- Describe the use case model.(L2)
- Develop an effective documentation.(L3)
- Explain the Classification Theory.(L2)
- Describe the responsibilities and collaborators process.(L2)
- Illustrate with case studies.(L3)

UNIT - IV

Identifying Object Relationships, Attributes, and Methods: Associations, Super-Sub Class Relationships, Aggregation, Class Responsibility, Object Responsibility.
Design Processes and Design Axioms: Object-Oriented Design Process, Object-Oriented Design Axioms, Corollaries, Design Patterns
Class Design: The Process, Class Visibility, Refining Attributes, Designing Methods and Protocols, Packages and Managing Classes, Case Studies. (10)

Learning Outcomes:

By the end of this Unit, the student will be able to

- Explain the association patterns. (L2)
- Describe the super-sub class, a-part-of relationships. (L2)
- Illustrating a case study for relationship analysis.
- An illustration of Bank Object (online) by defining it attributes, methods and messages.(L2)
- Describe the Design Patterns (L2)
- Design the class with refined attributes and methods. (L3)

UNIT – V

Object Storage and Object Interoperability: Database Management Systems, Logical and Physical Database Organization and Access Control, Distributed Databases and Client-Server Computing, Next Generation of Client-Server Computing, The pure world, The Practical World, Multi-database Systems, Designing Access Layer Classes, Case Study.
View layer : User Interface Design as a creative Process, Designing View Layer Classes, Macro-Level Process, Micro-Level Process, The Purpose, Prototyping the User Interface, Case Study (10)

Learning Outcomes:

By the end of this Unit, the student will be able to

- Understand the database models. (L1)
- Differentiate between the logical and physical database organization. (L2)
- Understand the concept of client-server with regard to distributed databases and distributed objects computing. (L1)
- Explain the identification of common identification patterns.

- Describe the view layer classes.(L2)
- Explain the micro level process.(L2)
- Demonstrate the view level interface.(L3)
- Illustrate with case studies.(L3)

Text Book:

Object Oriented Systems Development by Ali Bahrami, McGraw Hill International Edition , 2017.

Reference Book:

Object Oriented Analysis and design by Grady Booch, Addison Wesley publications,3rd Edition, 2007.

Course Outcomes:

Upon completion of the course, the student is able to

- To adapt different process models using UML.(L6)
- Able to identify and understand the requirements and develop the analysis models using UML concepts.(L6)
- Develop object design using UML models.(L6)
- Develop user interface design using UML models.(L6)
- Examine the various testing strategies ,debugging principles and case studies.(L4)

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CSCI3041 PHP PROGRAMMING

Hours per week: 4 End Examination: 60Marks

Credits:4 Sessionals: 40Marks

Preamble: This course provides basic concepts about PHP, Database connectivity and advanced PHP programming skills. Use PHP and MySQL to develop dynamic web sites for users on the Internet. This course will help to develop web sites ranging from simple online information forms to complex e-commerce sites. After successful completion of this course students are able to develop web applications.

Course Objective: The objective of this course is to provide the necessary knowledge to design and develop dynamic, database-driven web applications using PHP version 5. Students will learn how to connect to any ODBC-compliant database, and perform hands-on practice with a MySQL database to create database-driven HTML forms and reports etc. Students also learn how to configure PHP and Apache Web Server. Comprehensive lab exercises provide facilitated hands-on practice crucial to develop competence web sites.

UNIT I

Introduction : What is PHP? – History of PHP – Installing PHP – Language Basics: Lexical Structure – Data types – What's a Variable?– PHP variable and value types – Using PHP Variables – Expression and Operators – #Flow Control statements# (**No of Hours : 12)**

UNIT II

Functions : Calling a function – Defining a function – Introduction to Strings – Comparing Strings – Manipulating and Searching strings – #Arrays: Types of Arrays# – Array functions – Storing data in Arrays (**No of Hours : 12)**

UNIT III

Form Handling: Form Validation – $_GET variable – $_ POST variable – $_REQUEST variable – Creating the Form –#Creating the Upload script# – Using your File system: File paths and permissions – Displaying directory contents – Working with fopen( ) and fclose( ) (**No of Hours : 12)**

UNIT IV

Using Cookies : What are Cookies? – Setting Cookies – Using Cookie variables – Session Basics: What's a session? – Understanding Session variables – Managing User preferences with Sessions – Graphics: Drawing functions – #Creating and Drawing images#. (**No of Hours : 12)**

UNIT V

Installing and Configuring MySQL :Establishing a connection and poking around – Creating a database table – Inserting data into the table – #Selecting and displaying data (**No of Hours : 12)**

Texbook(s)

1. Julie Meloni and Matt Telles,'PHP 6 Fast and Easy Web Development',1st,DelmarCengage Learning; ,USA,2008,1598634712,topic mapping

Additional Reading(s)

1. Kevin Tatroe, Peter MacIntyre and RasmusLerdorf,'Programming PHP',3rd, O'REILLY media,India,2013,9781449392772,topic mapping

Course Outcomes(COs)

1.To build PHP Basic syntax for variable types and calculations(L3)
2 To Build Creating conditional structures(L3)
3 To Build Storing data in arrays Using PHP built-in functions and creating custom functions(L3)
4 To build and understanding POST and GET in form submission(L3)

CSCI3051 PHP PROGRAMMING LAB

Hours per week: 2 **Continuous Evaluation: 100 Marks**

Credits: 1

Objective: Introduction to the open source Web scripting language PHP. Build dynamic Web applications. Semantics and syntax of the PHP language, including discussion on the practical problems that PHP solves. Write server-side cross-platform HTML-embedded scripts to implement dynamic Web pages that interact with databases and files.

1 Write a PHP program to find whether given number is prime or not
2 Write a PHP program using Conditional Statements
3 Write a PHP program to find the maximum value in a given 2 Dimensional Aarray

4 Create a PHP page using functions for comparing three integers and print the largest number

5 Write a PHP program to find the factorial of a given number using user-defined functions

6 Design a simple web page to generate multiplication table for a given number using PHP.

7 Write a PHP program to print Fibonacci series using recursion.
8 Write a PHP program to illustrate Indexed Arrays

9 Write a PHP program to illustrate Associative Arrays

10 Write a PHP program to illustrate two Dimensional array
11 Write a PHP program to down load a file from the server.
12 Write a PHP program to store the current date and time in a COOKIE and display the‘ Last Visited’ date and time on the webpage.
13 Write a PHP program to store page views count in SESSION, to increment the count on each refresh and to show the count on web page.
14 Write a PHP program to design a simple calculator
15 Design an authentication web page in PHP with MySQL to check username And password.

Textbook(s)

1. Julie Meloni and Matt Telles,'PHP 6 Fast and Easy Web Development',1st,Delmar Cengage Learning,USA,2008,1598634712

Course outcomes

1 To implement the basic concepts of PHP programming like functions, Flow Control statements(L3)
2 To implement the different types of arrays(L3)
3 To implement the COOKIE (L3)
4 To implement the PHP with MySQL(L3)

CSCI3021 R PROGRAMMING LAB

Hours per week: 2 **Continuous Evaluation: 100 Marks**
Credits: 1

Objective: To make the students to learn how to program in *R* and how to use *R* for effective data analysis.

1. What is R? and Data Types
    a. Download, Install, Configure
    b. Learn to use help()function
    c. Understand data types in R (logical, numeric,etc)
    d. Convert data types
2. Getting Data In and Out ofR
    a. Create, find, and remove data(vector, matrix, data frame) inR
    b. Read external data into R(.txt,.csv)
    c. Write R data into external files(.txt,.csv)
3. Manipulating on Strings
    a. Understand and manipulate strings(e.g. substr(),scan())
    b. Understand indexing of data in vectors, matrices, and data frames
    c. Graphing techniques to visualize data selection
4. Operators, Vectors ,Matrices, Array, Lists, Data Frames and math functions
    a. Learn about operators(mathematics, logical, miscellaneous)
    b. Learn about basic math functions(e.g.sum())
    c. Use operators and math functions onvariables
5. Plotting Data
    a. Dot Plots
    b. Histograms
    c. Box Plots
6. Using Control Structures
    a. Understand if else statement
    b. Use if else statement for data manipulation
    c. Compare if else statement with ifelse()function
    d. Learn about ifelse() function
    e. Use ifelse() function on vectors and matrices
    f. Use graphs to show the results
7. Working with Loops
    a. Understand how loops work in R
    b. Create your own loop for vectors
    c. Create a series of graphs with loop functions
    d. Learn to use break and next statements in loops
    e. Use loops to create and change data in vectors, matrices, and arrays
    f. Use loops to create data as a list
    g. Learn about double loops
    h. Create your own double loops for matrix
    i. Use operators and functions in single and double loops
8. Using control structure, math function in loops
    a. Use ifelse() function in loops
    b. Combine loops and if else statement
    c. Represent your results with graphs
    d. Use math functions in loops
    e. Use math functions in if else statement
    f. Show your results with graphs
9. Understand advanced functions such as apply() andby()
10. Use apply() and by() to calculate descriptive statistics
11. Create graphs for the calculated descriptive statistics

Reference Books:

1. R Cook Book by Paul Teetor, Orielly Publications,2011.
2. Efficient R Programming : A Practical Guide to Smarter Programming by Colin Gillespie & Robin Lovealce, O'Reilly,2017

Course Outcomes:

Upon completion of the course, the student is able to

- To discuss data in and out of R ,Strings, operators, vectors list motivation for learning a programming language(L1)
- To transform your datasets into a form convenient for analysis(L3)
- To demonstrate plotting of data with various techniques(L5)
- To examine control structures and working with loops(L4)
- To learn advanced functions and create graphs for statistics(L5)

CSCI3061 DATA VISUALIZATION USING TABLEAU

Hours per week: 4 **Continuous Evaluation: 100 Marks**

Credits: 2

Objective: To make students aware of the basics of the fast growing data visualization tool this is currently being used in the BI Industry.

1. Program to Demonstrate the Data Sources, Custom Data View, Extracting Data.
2. Program to Demonstrate the Fields Operations, Editing Metadata.
3. Program to Demonstrate the Data Joining, Data Blending.
4. Program to Demonstrate the Worksheets.
5. Program to Demonstrate the Add Worksheets, Rename Worksheet, Save &Delete Worksheet, Reorder Worksheet, Paged Workbook.
6. Program to Demonstrate the Calculations.
7. Program to Demonstrate the Operators.
8. Program to Demonstrate the Functions.
9. Program to Demonstrate the Numeric Calculations, String Calculations.
10. Program to Demonstrate the Date Calculations, Table Calculations, LOD Expressions.
11. Program to Demonstrate the Sort & Filters, Basic Sorting, Basic Filters.
12. Program to Demonstrate the Quick Filters, Context Filters, Condition Filters, Top Filters
13. Program to Demonstrate the Charts, Bar Chart, Line Chart, Pie Chart, Crosstab, Scatter Plot.
14. Program to Demonstrate the Bubble Chart, Bullet Graph, Box Plot, Tree Map, Bump Char, Gantt Chart.
15. Program to Demonstrate the Histogram, Motion Charts, Waterfall Charts.

Text Book:

1. Tableau your data: Fast and Easy Visual Analysis with Tableau Software by Murray, Daniel G.: Wiley India, 2014.

Reference Books:

1. Learning Tableau by Milligan, N., PACKT / Shroff Publishers,2015.
2. Communicating Data with Tableau by Jones, B, PACKT Shroff Publishers,2014.
3. Power Pivot and Power BI Collie by Rob., Singh, Avichal, Holy Macro Books,2016.

Course Outcomes:

Upon completion of the course, the student is able to

- To demonstrate various programs which includes data ,field operations, date operations. (L6)
- To discuss worksheets and various operations on worksheets.(L6)
- To demonstrate calculations, operations, Designing applications using time serious data and its related concepts.(L6)
- To demonstrate various filters.(L6)
- To demonstrate various charts.(L6)

CSCI3071 INTRODUCTION TO CLOUD COMPUTING

Hours per week: 4 End Examination: 60Marks

Credits:4 Sessionals: 40Marks

Preamble:

This course will help the students to get familiar with Cloud Computing Fundamental concepts, technologies, architecture and state-of-the-art in Cloud Computing fundamental issues, technologies, applications and implementations.

Course Objectives:

- To understand basic concepts related to cloud computing technologies and concepts of cloud delivery models IaaS, PaaSandSaas
- To evaluate the underlying principle of Data Center, cloud virtualization, cloud multitenant and service technologies.
- To implement different infrastructure and specialized mechanisms related to cloud storage and usage monitor.
- Fundamentals of cloud computing architectures based on current standards, protocols, and best practices.

UNIT - I

Define: What is a cloud? Hype cycle, Implantation gap, Common Definition Metaphorical Interpretation, Attributes.

Cloud Architecture: Stack Management Layers, Standards and Interoperability, Private Cloud, Community Cloud, Hybrid Cloud, Cloud Maturity. (8)

Learning Outcomes

By the end of this Unit, the student will be able to

- Define cloud and common definitions.(L1)
- Describe cloud architecture and varies types of clouds.(L2)

UNIT - II

Infrastructure as a Service: Infrastructure Stack, Servers, Storage, Network, Integration, Management, Payment and Billing, Iaas Landscape.

Platforms a Service: Web Application Frameworks, Web Hosting Services, Google App Engine, Microsoft Windows Azure, Force.com, Additional Platforms.

Software as a service: Customer Relationship Management, Human Resources, Financial, Collaboration, Backup and Recovery, Industry Solutions. (10)

Learning Outcomes

By the end of this Unit, the student will be able to

- Explain the cloud as infrastructure as service and its related concepts.(L2)
- Describe the cloud as platform as service and its related concepts.(L2)
- Demonstrate the cloud as software as service and its related concepts.(L2)

UNIT - III

Benefits and Challenges: Benefits, Challenges, Recommendations.

Strategic Impact: What is Strategy? Strategic Analysis, External Analysis, Internal Analysis, Strategic Realignment.

Risk Impact: Notion of Risk, Risk Management, Cloud Impact, Enterprise Wide Risk Management.

Financial Impact: Resource Costs, Return on Investment, Cash Flow, Financial Visibility, Return on Assets. (10)

Learning Outcomes

By the end of this Unit, the student will be able to

- Discuss various benefits and challenges of cloud.(L6)
- Explain strategic impact and its related concepts of cloud.(L2)

- Discuss risk impact and its related concepts of cloud.(L6)
- Elaborate financial impact and its related concepts of cloud.(L6)

UNIT - IV

Requirements Analysis: Strategic Alignment, Architecture Development Cycle.
Draft Architecture: Business Process Modeling, Architecture Modeling, Preliminary Design.
Application Inventory: Options, Stakeholders, Business criteria, Technical criteria, Cloud Opportunities, Analysis, Net Benefit and Risk, New Opportunities.
Service Components: Service Delivery Model, Potential Providers, Evaluation Criteria and Weight. (12)

Learning Outcomes

By the end of this Unit, the student will be able to

- Discuss requirement analysis and its related concepts.(L6)
- Explain draft architecture and it related concepts.(L2)
- Discuss application inventory and its related concepts.(L6)
- Explain service components and its related concepts.(L2)

UNIT – V

User Profiles: Options, Segmentation Criteria, Profile Classification, Application Map, Identity Management, Compliance.
End-to-end Design: Technical Design, Devices, Connectivity, Physical Infrastructure, Management, Metering and Billing, Hybrid Cloud Design.
Connectivity: Network Connectivity, Content Delivery Networks, Application Connectivity, Information Connectivity. (10)

Learning Outcomes

By the end of this Unit, the student will be able to

- Discuss user profiles and its related concepts.(L6)
- Explain end to end user design and managing cloud issues.(L2)
- Discuss network connectivity and its related concepts of cloud.(L6)

Text Book:

1. Cloud Computing Explained by John Rhoton, Recursive Press, 2013.

Reference Books:

1. Cloud Computing, Principles, Systems and Applications by Nick Antonopoulos and Lee Gilliam Springer International Edition, 2015.
2. Cloud Computing Principles and Paradigms by Raj Kumar Buyya, James Broberg and Anderzej Goscinscinki, Wiley Publications,2011

Course Outcomes:

Upon completion of the course, the student is able to

- Define the basic concepts, terminology and the fundamental models.(L-1)
- Demonstrate the set of primary technology components and characteristics
- associated with cloud computing.**(**L-2)
- Discuss various benefits and challenges and various types of impact on cloud.(L-3)
- Elaborat**e** requirements analysis ,draft architecture ,application inventory and service components of cloud.(L4)
- Define user profile, end to end design and connectivity issues of cloud.(L6)

CSCI3081 INTRODUCTION TO BLOCK CHAIN

Hours perweek: 4 End Examination: 60Marks

Credits:4 Sessionals: 40Marks

Preamble:

This is new technology of digital currency. Block chains are to achieve decentralization. The system needs to validate transactions without anyone being able to veto transactions or control the network.

Course Objectives:

- Learn the basic concept of Cryptographic Hash Functions, Hash Pointers and Elliptic Curve Digital Signature Algorithm.
- A technical overview of decentralized digital currencies like Bitcoin, as well as their broader economic, legal and financial context.
- To get an insight into the working of the Bitcoin network, Wallet, Bitcoin mining and distributed consensus for reliability.

UNIT-I

The Growth of Block chain Technology Distributed System: The History of Blockchain and Bitcoin, Types of Block chain, consensus.

Learning Outcomes:

- Learn the theoretical foundation of block chain(L2)
- Learn the basic concepts of distributed systems(L2)
- Understand the history of block chain technology(L1)
- Understand the structure of a block chain.(L1)

UNIT-II

Decentralization: Decentralization using block chain, methods of decentralization, routes to decentralization, platform for decentralization.

Learning Outcomes:

- Learn various methods of decentralization(L2)
- Understand the various applications of decentralization(L1)
- Understand the decentralized architecture.(L1)

UNIT-III

Public Key Cryptography: Asymmetric cryptography, public and private keys, RSA, Hash Functions, Elliptical Curve Digital Signature Algorithm (ECDSA).

Learning Outcomes:

- Identify necessity of a HASH function.(L1)
- Learn the importance of digital signature.(L2)
- Understand digital signature algorithms.(L1)
- Learn the mechanism of simple crypto currency.(L2)

UNIT-IV

Introduction to Bitcoin: Bitcoin, Digital keys and address, transactions, blochchain, mining

Learning Outcomes:

- Familiar with the cryptographic building blocks.(L3)
- Understand typical Crypto currency such as Bitcoin.(L1)
- Learn the underlying principles and techniques associated with blockchain technologies. (L3)
- Learn why it is better than a simple distributed database.(L2)

UNIT-V

Ethereum: Introduction, The Ethereum network, components of Ethereum ecosystem

Learning Outcomes:

- Learn why ethereum better than the Bitcoin. (L2)
- Understand the ethereum structure. (L1)
- Familiar with the ecosystem of ethereum. (L3)
- Learn the simple application of ethereum. (L2)

Text Book:

1. Imran Bashir, "Mastering Blockchain: Distributed Ledger Technology, Decentralization and Smart Contracts Explained", Second Edition, Packt Publishing, 2018.

Reference Book:

1. Bitcoin and Cryptocurrency Technologies: A Comprehensive Introduction by Arvind Narayanan, Joseph Bonneau, Edward Felten, Andrew Miller and Steven Goldfeder, Princeton Press, 2016.

Course Outcomes:

Upon completion of this course student will be able to

- Learn individual components of the Bitcoin protocol make the whole system tick.(L2)
- Learn the methods of security from a combination of technical methods and clever incentive engineering.(L2)
- Analyze the incentive structure in a blockchain based system and critically assess its functions, benefits and vulnerabilities. (L4)

CSCI3091 PROJECT WORK

Hours per week: 2 End examination: 50Marks

Credits:12 Sessionals : 150Marks

ROGRAM ELECTIVE

CSCI2101 INTRODUCTION TO CRYPTOGRAPHY

Hours per week:4 End Examination: 30Marks

Credits:4 Sessionals:70Marks

Preamble: Due to rapid growth of digital communication and electronic data exchange information security has become a crucial issue in industry, business and administration. Modern cryptograph provides essential techniques for securing information and protecting data.

Course Objectives:

- To enable the students to understand the importance of information security.
- To make them to understand attacks, cryptography, steganography.
- To know about the ciphers.
- To describe data encryption standards.

UNIT - I

Introduction: Security goals, Confidentiality, Integrity, Availability, Attacks, Attacks threatening Confidentiality, Attacks Threatening Integrity, Attacks Threatening Availability, Passive versus Active Attacks, Services and Mechanism, Security Services, Security Mechanisms, Relation Between Services and Mechanisms, Techniques, Cryptography, Steganography. (10)

Learning Outcomes:

By the end of the unit the student will be able to

- Explain different security goals.(L2)
- Differentiate between Passive and Active Attacks.(L3)
- Identify relationship between Services and Mechanisms.(L3)

Pedagogy tools:

Seminar , Lecture

UNIT - II

Traditional Symmetric Key Ciphers: Introduction, Kerckhoff's Principle, Cryptanalysis, Categories of Traditional ciphers, Substitution Ciphers, Mono alphabetic ciphers, Poly alphabetic Ciphers, Transposition Ciphers, Keyless Transposition Ciphers, Keyed Transposition Ciphers, Combining two approaches. (13)

Learning Outcomes:

By the end of the unit the student will be able to

- Understand Kerckhoff's Principle.(L3)
- Know about categories of Traditional ciphers.(L2)
- Know Keyless Transposition Ciphers, Keyed Transposition Ciphers.(L2)

Pedagogy tools:

Lecture

UNIT - III

Stream and Block Ciphers: Stream ciphers, Block Ciphers, Combination, Introduction to Modern Symmetric Key cipher, Modern Block Ciphers-Substitution or Transposition, Block Ciphers as Permutation Groups, Components of Modern Block Cipher, S-Boxes. (10)

Learning Outcomes:

By the end of the unit the student will be able to

- Develop substitution and transposition ciphers.(L3)
- Describe concepts of symmetric key ciphers.(L2)
- Explain concepts of modern block ciphers.(L2)
- Extend the concept of modern stream ciphers. (L2)

Pedagogy tools:

Lecture

UNIT - IV

Product Ciphers: Introduction, two Classes of Product Ciphers, Feistel Ciphers, Non-Feistel Ciphers, Attacks on Blocks Ciphers, Modern Stream Ciphers. (8)

Learning Outcomes:

By the end of the unit the student will be able to

- Describe Feistel Ciphers, Non-Feistel Ciphers.(L3)
- Demonstrate Attacks on Blocks Ciphers.(L4)
- Explain Modern Stream Ciphers.(L3)

Pedagogy tools:

Lecture

UNIT - V

Data Encryption Standard (DES): Introduction, DES Structure, Multiple DES.

Asymmetric-Key Cryptography: Introduction, RSA Cryptosystem. (10)

Learning Outcomes:

By the end of the unit the student will be

able to Outline the structure of DES. (L2)

Illustrate the analysis of DES. (L3)

Explain the concept of Asymmetric-Key Cryptography. (L2)

Pedagogy tools:

Lecture

Text Book:

1. Cryptography and Network Security by Behrouz A. Forouzan, Tata McGraw-Hill Special Indian edition, 2007.

Reference Books:

1. Cryptography and Network Security by William Stallings, Pearson Education,2011.
2. Cryptography and Network Security by AtulKahate, Tata McGraw-Hill Publishing Company Limited,2003.

Course Outcomes:

Upon completion of the course the student will be able to

- Understand the importance of computer security.(L2)
- Identify the differences between different types of ciphers.(L4)
- List the concepts of block ciphers and stream ciphers.(L4)
- Able to outline structure of DES.(L3)
- List the concepts of asymmetric key cryptography.(L4)

CSCI2111 FUNDAMENTALS OF ARTIFICIAL INTELLIGENCE

Hoursperweek:4 EndExamination:30Marks

Credits:4 Sessionals:70Marks

Preamble:

Intelligent machines has replaced human capabilities in many areas. Artificial intelligence is the intelligence exhibited by machines or software. It is the branch of computer science that emphasizes on creating intelligent machines that work and react like humans. Artificial Intelligence spans a wide variety of topics in computer science research, including machine learning, deep learning, reinforcement learning, natural language processing, reasoning, perception etc.

Course Objectives:

- The basic fundamental concepts of Artificial Intelligence and the participants will get to learn in the future about Machine learning, Deep Learning, explore the Platforms for AI, implement methods to solve problems using Artificial Intelligence and Natural Language Processing, etc.
- To make the students to understand about the building blocks of AI such as Search, Knowledge representation, inference, logic, and learning and the concepts of Natural Language Processing.

UNIT-I

Introduction: Introduction to Artificial Intelligence, Historical Backdrop, What is Intelligence, The bottom line.

State Space Search: Generate the test, Simple search, Depth First Search (DFS), Breadth First Search (BFS), Comparison of BFS and DFS, Quality of solution, Depth Bounded DFS (DBDFS), Depth First Iterative Deepening(DFID). (12)

Pedagogy tools:

Self-reading , Video , Seminar , Lecture , Case study , NPTEL

Learning Outcomes:

At the end of the unit, the student will be able to:

- list the contributions and application of AI.
- Characterize the goals of AI, approaches to and progress toward those goals.
- Describe logic programming and basic constructs used in AI programming.
- Explain the problem solving by Searching State Space(L4)
- Describe DFS & BFSalgorithm.
- Compare BFS and DFS.
- Discuss the quality measure as the length of solution.

UNIT – II

Heuristic Search: Heuristic Functions, Best First Search, Hill Climbing, Local Maxima, Solution Space Search, Variable Neighborhood Descent, Beam Search, Tabu Search, Peak to Peak Methods. (10)

Pedagogy tools:

Self-reading , Video , Seminar , Lecture , Case study , NPTEL

Learning Outcomes:

At the end of the unit, the student will be able to:

- What is the idea of using heuristic function.(L1)
- Illustrate the idea of heuristic functions with a problem.(L3)
- Explain heuristic functions and heuristic search.(L3)
- Describe greedy search methods.(L3)
- Explain Hill Climbing algorithm.(L2)
- Compare constructive search problems and perturbation search.(L2)
- Define Neighborhood functions.(L1)

UNIT – III

Finding Optimal Paths: Brute Force, Branch and Bound, Refinement Search, Dijkstra's Algorithm, Algorithm A*, Admissibility of A*, Iterative Depending A* (IDA*), Recursive Best First Search (RBFS), Pruning the CLOSED list, Pruning the OPEN list, Divide and Conquer Beam Stack Search. (12)

Pedagogy tools:
Self-reading , Video , Seminar , Lecture , Case study , NPTEL

Learning Outcomes:

At the end of the unit, the student will be able to:

- List the methods for optimization to find good solutions in a leastcost.(L1)
- Discuss optimization techniques.(L3)
- Explain the refinement search method.(L2)
- Explain the well known shortest path algorithm.(L3)

UNIT – IV

Concepts & Language: The Conceptual Domain: The Ontologies base, Reification, RDF and Semantic Web, Properties, Event Calculus, Conceptual Dependency Theory, Conceptual Analysis. (10)

Learning Outcomes:

At the end of the unit, the student will be able to:

- What is the concept ofAI.(L1)
- Explain the concept of Ontology.(L3)
- Discuss the ontology infrastructure for the semantic web..(L2)
- Understand the conceptual dependency in AI.(L2)

UNIT – V

Natural Language Processing: Classic problems in NLP and schools of thought, Basic NLP Techniques, Applications, Natural Language Generation. (8)

Learning Outcomes:

At the end of the unit, the student will be able to:

- What is NLP.(L1)
- Explain the classic problems inNLP.(L2)
- Illustrate the applications on NLP.(L2)
- What the basic NLP techniques.(L3)

Text Book:

1. A first course in Artificial Intelligence by Deepak Khemani, TMH, 2013.

Reference books:

1. Artificial Intelligence by Elaine Rich, Kevin Knight, Shivashankar B Nair TMH, 3rd edition.
2. Artificial Intelligence simplified understanding the basic concepts by Binto George, Gail Carmichael, CST,2016.

CourseOutcomes:

Upon completion of the course, the student is able to

- Discuss the basic fundamental concepts of Artificial Intelligence.(L6)
- What is the future of AI.(L1)
- Explain different AI techniques used.(L5)
- Develop Applications of AI.(L3)

CSCI3011 INTRODUCTION TO DATA MINING

Hours per week: 4 End Examination: 60Marks

Credits:4 Sessionals: 40Marks

Preamble

Data warehousing and data mining is one of the most advanced fields of computer science which involves use of Mathematics, Statistics, Information Technology and information Sciences in discovering new information and knowledge from large databases It is a new emerging interdisciplinary area of research and development which has created interest among scientists of various disciplines like computer science, mathematics, statistics, information technology.

Course Objectives:

- To learn the basic concepts and techniques of data mining,
- To study about Frequent Item sets and Related Algorithms and Classification,
- To learn about Clustering Concepts.

UNIT - I

Introduction: What motivated data mining? why is it important? What is data mining? data mining-on what kind of data? data mining functionalities, what kinds of patterns can be mined? Are all of the patterns interesting? Classification of data mining systems, Data mining task primitives, Integration of a data mining system with a database or data warehouse system.(12)

Learning Outcomes:

By the end of this Unit, the student will be able to

- Discuss about data mining and its importance(L6)
- Demonstrate data mining functionalities(L2)
- List the kind of patterns that can bemined(L1)
- Explain classification of data mining systems(L2)
- Discuss data mining task primitives(L6)
- Explain integration of data mining with other technologies(L2)

UNIT - II

Data pre-processing: Types of data sets and attribute values, basic statistical descriptions of data, data visualization, measuring data similarity, data quality, major tasks in data preprocessing, data reduction, Data transformation and data discretization, data cleaning and data integration. (12)

Learning Outcomes:

By the end of this Unit, the student will be able to

- Discuss data objects and attribute types.(L6)
- Solve the Statistical problems including data similarity and dissimilarity.(L6)
- Interpret the various preprocessing techniques.(L5)

UNIT - III

Mining frequent patterns, associations and correlations: Basic concepts, applications of frequent pattern and associations, frequent pattern and association mining, mining various kinds of association rules, a priori algorithm, FP growth algorithm. (12)

Learning Outcomes:

By the end of this Unit, the student will be able to

- Define the terminology related to Association mining
- Demonstrate the working of A priori and FP Growth algorithms.(L2)
- Develop Association rules from frequent item sets.(L6)
- Interpret pattern evaluation methods.(L5)

UNIT - IV

Classification Analysis: Classification: Basic concepts, decision tree induction, Bayes classification methods, rule-based classification, model evaluation and selection, classification by neural networks, techniques to improve classification accuracy. (12)

Learning Outcomes:

By the end of this Unit, the student will be able to

- Discuss the basic concepts of Classification.(L6)
- Discuss various classification techniques.(L6)
- Explain various classification techniques.(L5)
- Identify techniques to improve classification accuracy.(L3)

UNIT - V

Cluster Analysis: Basic concepts and methods, clustering structures, major clustering approaches, partitioning methods, hierarchical methods, density based methods, model-based clustering: the expectation-maximization method. (12)

Learning Outcomes:

By the end of this Unit, the student will be able to

- Define cluster analysis.(L6)
- Explain various types of clustering methods.(L5)
- Evaluate measures of clustering tendency.(L5)

Text Books:

1. Data Mining: Concepts and Techniques by Jiawei Han, MichelineKamber, JianPei ,Morgan Kaufmann publishers, 3rd edition,2011.

Reference Books:

1. Introduction to Data Mining by Michael Steinbach, Vipin Kumar, Pang-Ning Tan, Addison Wesley, 1/e ,2006.
2. Data Mining: Introductory and Advanced Topics by Margaret H. Dunham, Data,1/e Pearson Publishers,2006.

Course Outcomes:

Upon completion of the course, the student is able to

- Discuss and define data warehousing and data mining.(L6)
- Interpret data and apply preprocessing techniques.(L5)
- Explain association rule mining algorithms and evaluate patterns.(L5)
- Explain various classification techniques and find accuracy.(L5)
- Elaborate various clustering methods and evaluate them(L6)

CSCI3031 FUNDATIONS OF DATA SCIENCE

Hours per week: 4 End Examination: 60Marks

Credits:4 Sessionals: 40Marks

Preamble:

This course covers foundational techniques and tools required for data science. The course focuses on concepts, principles, and techniques applicable to any technology environment and industry and establishes a baseline that can be enhanced by further formal training and additional real-world experience.

Course Objectives:

- To discuss basics of python programming and its related concepts.
- To demonstrate data in various visual representation and learn about mathematical concepts of linear algebra and statistics.
- To learn machine learning concepts and its various algorithms.
- To discuss various regression and decision tree concepts.
- To learn neural networks, clustering, natural language processing.

UNIT-I

A crash course in Python : The basics, Getting Python, The Zen of Python, Whitespace Formatting, Modules, Arithmetic, Functions, Strings, Exceptions, Lists, Tuples, Dictionaries, Sets, Control flow, Sorting, Generators and Iterators, Randomness, Regular Expressions, Object-Oriented Programming, Functional Tools, enumerate. (12)

Learning Outcomes:

By the end of this Unit, the student will be able to

- Discuss the python fundamental concepts.(L6)
- Explain various arithmetic operators, functions, strings, control structures.(L2)
- Describe object oriented programming concepts.(L2)

UNIT-II

Visualizing Data: Matplotlib, Bar charts, Line Charts, Scatter plots.

Linear Algebra: Vectors, Matrices.

Statistics: Describing a single set of data, Central Tendencies, Dispersion, Correlation, Simpson's Paradox, Correlation and Causation. (10)

Learning Outcomes:

By the end of this Unit, the student will be able to

- To demonstrate data in various visual(L6)
- Explain linear algebra concepts(L2)
- Describe basic fundamental concepts of statistics.(L2)

UNIT-III

Machine Learning: Modeling, What Is Machine Learning, Over fitting and Under fitting , Correctness , The Bias-Variance Trade-off , Feature Extraction and Selection

K-Nearest Neighbors: The Model, The Curse of Dimensionality

Naive Bayes: A Really Dumb Spam Filter, A More Sophisticated Spam Filter, Implementation, Testing Our Model

Simple Linear Regression: The Model , Using Gradient Descent , Maximum Likelihood Estimation. (12)

Learning Outcomes:

By the end of this Unit, the student will be able to

- Discuss various machine learning algorithms(L6)
- Explain Naïve Bayes concepts(L2)
- Describe linear regression and its related concepts(L2)

UNIT-IV

Multiple Regressions: The Model, Further Assumptions of the Least Squares Model, Fitting the Model, Interpreting the Model, Goodness of Fit

Logistic Regression: The Problem, The Logistic Function, Applying the Model, Goodness of Fit, Support Vector Machines

Decision Trees: What Is a Decision Tree? , Entropy, The Entropy of a Partition, Creating a Decision Tree, Putting It All Together, Random Forests. (12)

Learning Outcomes:

By the end of this Unit, the student will be able to

- Discuss the multiple regression and its related concepts(L6)
- Explain logistic regression and its related concepts (L2)
- Describe decision tree and its related concepts(L2)

UNIT-V

Neural Networks: Perceptions , Feed-Forward Neural Networks, Back propagation

Clustering: The Model ,Example: Meetups , Choosing k , Example: Clustering Colors, Bottom-up Hierarchical Clustering.

Natural Language Processing: Word Clouds, n-gram Models, Grammars (10)

Learning Outcomes:

By the end of this Unit, the student will be able to

- Explain about Neural Networks and its related Concepts.(L2)
- Describe clustering and various types of clustering.(L2)
- Describe natural language processing.(L2)

Textbook:

1. Data Science from Scratch First Principles with python by Joel Grus, O'Reilly Media, 2015.

Reference Books:

1. Data Analytics Made Access by Anil Maheshwari,2019.
2. Python for Data Analysis step-by-step tutorial for Beginners by Samuel Burns, Global Tech and Amazon KDP,2019.

Course Outcomes:

Upon completion of the course, the student is able to

At the end of this course, students will be able to

- List motivation for learning a programming language.(L1)
- To transform data in visualized fashion.(L3)
- To learn linear algebra, various statistical Techniques. (L5)
- To examine Multiple Regressions**,** Logistic Regression, Decision Trees.(L4)
- To learn Neural Networks, Clustering, Natural Language Processing(L5)