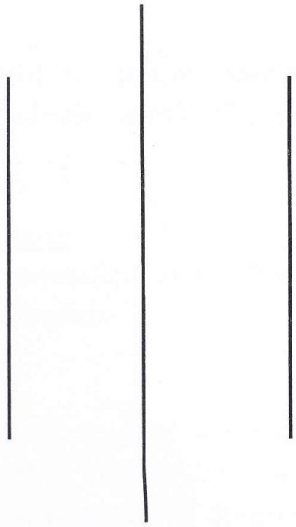
Curriculum of Bachelor of Arts in Computer Application (BCA)



Submitted By

Computer Application Subject Committee
Faculties of Humanities and Social Science
Tribhuvan University

Submitted To

Dean's Office, Faculty of Humanities and Social Sciences
Tribhuvan University
Kirtipur, Nepal
2014

Title

The title of the program is Bachelor of Arts in Computer Application (BCA).

Objective

The objective of the Bachelor of Arts in Computer Application (BCA) at the Faculty of Humanities and Social Sciences of Tribhuvan University is to produce high quality computer application users and developers.

Duration of the Program

The program of study for Bachelor of Arts in Computer Application (BCA) is over a period of eight semesters (four academic years). The academic year begins in the September and February of each year.

Medium of Instruction and Examination

The medium of instruction and examination in the Bachelor of Arts in Computer Application (BCA) program shall be English.

Entry Requirement

The entry requirement for students in Bachelor of Arts in Computer Application (BCA) is Intermediate Level or Higher Secondary level (10+2) or equivalent in any discipline from a recognized institution with at least second division (45%) marks. Besides the basic academic requirement, an entrance examination will be conducted for all applicants by the concerned Dean's office.

Admission Procedure

The entrance test application form and the information brochure shall be provided on request at the concerned college or department. The concerned college or department scrutinizes the applications. The eligible candidates are informed to appear in the entrance test. The exact date for the entrance test is communicated to the applicants by the concerned Dean's office. The candidates shall be admitted on merit basis. The subjects and weightage of each subject for the Entrance test will be as follow:

English: 40%; Mathematics: 50% and General Knowledge: 10%

The college may also hold interviews for the candidates before their final selection for admission. The candidates, who are given provisional admission pending submission of the qualifying certificates, are required to submit all necessary documents within a week of the beginning of regular classes. Otherwise, the admission will be annulled.

Academic Schedule

The academic session of the University consists of two semesters per year. The Fall semester begins in September and the Spring Semester begins in February. For the Bachelor of Arts in Computer Application (BCA) program, student admission may commence either in the Fall semester or in the Spring semester, as approved by the university. Tribhuvan University publishes its yearly academic calendar. The affiliated colleges are required to follow the calendar.

Student Evaluation

The students' academic performance during a semester is evaluated using the system of continuous assessment (Internal Assessment and External Assessment). The college or concerned department conducts the internal assessment during the session and the University conducts the external assessment (Final Examination) at the end of each semester. Final practical examination shall be conducted by the college or the concerned department and the university will send the external examiner.

Each course shall have internal evaluation marks of 40% evaluated by the concerned faculty member. Generally, each course will have a written end semester examination (Final Examination) of 60% marks at the end of each semester. The internal marks shall be awarded on the basis of constant assessment. Normally, final examinations are not conducted for elective courses and in courses which are offered as intensive courses conducted by reputed international scholars. The mark weightage and time allocated for different assessment is given below.

Examination Scheme (Subjects with Practical)				
Internal Assessment		External Assessment		Total
Theory	Practical	Theory	Practical	
20%	20% (3 Hrs.)	60% (3 Hrs.)	-	100%

Examination Scheme (Subjects without Practical)		
Internal Assessment	External Assessment	Total
40%	60% (3 Hrs.)	100%

To pass in a subject, a student must obtain a minimum of 40% in that subject in internal assessment and D grade in the final examination. Students must pass 'Theory Internal Assessment', 'Practical Assessment' and 'Final Examination' separately.

The Credit System

Each course is assigned a certain number of credits depending generally upon its lecture, tutorial and practical work hours in a week. In theory subjects, one lecture per week is assigned one credit as a general rule.

Grading System

The grade (marks) awarded to a student in a course is based on his/her consolidated performance in sessional and final examinations. The letter grade in any particular

subject is an indication of a student's relative performance in that course. The pattern of grading is as follows:

Letter	Grade	Grade Point Description
A	4.0	Excellent
A-	3.7	
B +	3.3	
B	3.0	Good
B -	2.7	
C+	2.3	
C	2.0	Satisfactory
C-	1.7	
D+	1.3	
D	1.0	Work satisfying minimum requirement for credits
F	0	Failing

Only in very rare and unusual circumstances, if a student cannot finish all the required work for the course, he/she may be awarded an incomplete grade "I". If all the required work is not completed within the following semester, the grade of I will automatically be converted to an "F". A student receiving an "I" grade does not need to register for that subject in the following semester to complete the required works.

The performance of a student in a semester shall be evaluated in terms of the Semester Grade Point Average (SGPA) which is the grade point average for the semester. The cumulative grade point average (CGPA) is the grade point average for all completed semesters.

SGPA = Total honor points earned in a semester / Total number of credits registered in a semester

CGPA = Total honor points earned / Total number of credits completed

Attendance Requirement

The students must attend every lecture, tutorial and practical classes. However, to accommodate for sickness and other contingencies, the attendance requirement shall be a minimum of 80% of the classes actually held. If a student fails to attend 80% of the classes in any particular subject, he/she shall not be allowed to take the final examination in that subject.

Normal and Maximum Duration of Stay at the College

The normal duration for completing the Bachelor of Arts in Computer Application (BCA) program at the university will be four years. The maximum duration for the completion of the requirements will be the normal duration plus two years.

Course Registration

The academic record of a student is maintained in terms of the courses for which he/she registers in any semester, and the grades he/she obtains in those courses. Registration for

courses is done at the beginning of each semester. Since registration is a very important procedural part of the credit system, it is absolutely essential that all students present themselves at the college. In case of illness or any exceptional circumstance during the registration period, he/she must inform the Principal of the same. Registration in absentia may be allowed only in rare cases, at the discretion of the Principal. However, the student's nominee cannot register for courses but will only be allowed to complete other formalities.

Repeating a Course

A course may be taken only once for a grade, except when a student receives a D or F grade. Since passing of all core courses individually is a degree requirement, the student must retake the failing core course when offered and must successfully complete the course. Retaking a course in which a student has earned a D grade is optional. However, a student cannot retake more than two courses in which he/she has received D grade. The grade earned on the retake will substitute the grade earned first time the course was taken.

Elective Courses

The curriculum is oriented to have intensive study in the field of interest with course registration flexibility at least for four courses. But in future, course registration flexibility shall be increased to more number of courses.

Award of Degree

Tribhuvan University awards Bachelor of Arts in Computer Application (BCA) degree upon completion of all requirements as prescribed in the curriculum. Tribhuvan University awards grades as explained in the curriculum on the basis of individual student's relative performance. The minimum credit hours needed for Bachelor of Arts in Computer Application (BCA) degree is 126. Cumulative Grade Point Average (CGPA) for the degree shall be awarded upon completion of all requirements.

Scrutinizing of Final Examination Paper

Students may apply for re-totaling or rechecking of their grades as per University rule, upon payment of prescribed fee.

Note: The provisions of this document are not to be regarded as a binding contract between the University and the students. The University reserves the right to change any provisions or requirements contained in this document at any time, without pre-notification, within the students' term of residence.

Bachelor of Arts in Computer Application (BCA) Course Structure

Courses	Credit Hours
Computer Application (Core Courses)	71 (4*2+3*21)
Elective Courses	12 (3+3+3+3)
Mathematics & Statistics Courses	9 (3+3+3)
Language Courses	6 (3+3)
Social Sciences & Management Courses	15 (3+3+3+3+3)
Projects & Internships	13 (2+2+6+3)
Total Credit Hours	**126**

First Year

First Semester

SN	Course Code	Course Title	Credit Hrs.	Lecture Hrs.	Tutorial Hrs.	Lab Hrs.
1	CACS101	Computer Fundamentals & Applications	4	4	-	4
2	CASO102	Society & Technology	3	3	-	-
3	CAEN103	English I	3	3	1	-
4	CAMT104	Mathematics I	3	3	1	1
5	CACS105	Digital Logic	3	3	-	2
Total			16	16	2	7

Second Semester

1	CACS151	C Programming	4	4	1	3
2	CAAC152	Financial Accounting	3	3	1	1
3	CAEN153	English II	3	3	1	-
4	CAMT154	Mathematics II	3	3	1	1
5	CACS155	Microprocessor and Computer Architecture	3	3	1	2
Total			16	16	5	7

Second Year

Third Semester

SN	Course Code	Course Title	Credit Hrs.	Lecture Hrs.	Tutorial Hrs.	Lab Hrs.
1	CACS201	Data Structures &Algorithms	3	3	-	3
2	CAST202	Probability and Statistics	3	3	1	1
3	CACS203	System Analysis and Design	3	3	1	-
4	CACS204	OOP in Java	3	3	1	2
5	CACS205	Web Technology	3	3	-	3
Total			15	15	3	9

Fourth Semester

1	CACS251	Operating System	3	3	1	2
2	CACS252	Numerical Methods	3	3	1	2
3	CACS253	Software Engineering	3	3	1	-
4	CACS254	Scripting Language	3	3	-	3
5	CACS255	Database Management System	3	3	1	2
6	CAPJ256	Project I	2	-	-	4
Total			17	15	4	13

Third Year

Fifth Semester						
SN	Course Code	Course Title	Credit Hrs.	Lecture Hrs.	Tutorial Hrs.	Lab Hrs.
1	CACS301	MIS and e-Business	3	3	-	2
2	CACS302	DotNet Technology	3	3	-	3
3	CACS303	Computer Networking	3	3	-	2
4	CAMG304	Introduction to Management	3	3	1	-
5	CACS305	Computer Graphics and Animation	3	3	1	2
Total			15	15	2	9
Sixth Semester						
1	CACS351	Mobile Programming	3	3	-	3
2	CACS352	Distributed System	3	3	1	-
3	CAEC353	Applied Economics	3	3	1	-
4	CACS354	Advanced Java Programming	3	3	-	3
5	CACS355	Network Programming	3	3	-	2
6	CAPJ356	Project II	2	-	-	4
Total			17	15	2	12

Fourth Year

Seventh Semester						
SN	Course Code	Course Title	Credit Hrs.	Lecture Hrs.	Tutorial Hrs.	Lab Hrs.
1	CACS401	Cyber Law & Professional Ethics	3	3	1	-
2	CACS402	Cloud Computing	3	3	-	3
3	CAIN403	Internships	3	-	-	-
4		Elective I	3	3		
5		Elective II	3	3		
Total			15	12		
Eighth Semester						
1	CAOR451	Operations Research	3	3	1	-
2	CAPJ452	Project III	6	-	-	12
3		Elective III	3	3		
4		Elective IV	3	3		
Total			15	9		

List of Electives

SN	Course Code	Course Title	SN	Course Code	Course Title
1	CAPS476	Applied Psychology	6	CACS482	Knowledge Engineering
2	CACS477	Geographical Information System	7	CACS483	Advanced DotNet Technology
3	CACS478	IT in Banking	8	CACS484	Database Programming
4	CACS479	Hotel Information System	9	CACS485	Database Administration
5	CAER480	Enterprise Resource Planning	10	CACS486	Network Administration

Course Title: **Computer Fumdamentals and Applications (4 Cr.)**
Course Code: **CACS101**
Year/Semester: **I/I**
Class Load: **8 Hrs. / Week (Theory: 4 Hrs., Practical: 4 Hrs.)**

Course Description

This course offers fundamental concepts of computer and computing which includes introduction to computer system, computer software & database management system, operating system, data communication & computer network and contemporary technologies. It also aims at helping students convert theoretical concept into practical skill through the use of different application packages including word processor, spreadsheet package, presentation package and photo editing graphical package.

Course Objectives

The general objectives of this course are to provide fundamental concepts of information and communication technology and to make students capable of using different application packages in their personal as well as professional life.

Course Contents

Unit 1 Introduction to Computer System **16 Hrs.**

Introduction to Computer, Characteristics of Computer, Applications of Computer, Classification of Computer, Mobile Computing, Anatomy of a Digital Computer, Computer Architecture, Memory & Its Classification, Input devices, Output Devices, Interfaces.

Unit 2 Computer Software **3 Hrs.**

Introduction to Software, Types of Software, Program vs. Software, Computer Virus and Antivirus.

Unit 3 Operating System **4 Hrs.**

Introduction to Operating System, Function of Operating System, Types of Operating System, Open Source Operating System.

Unit 4 Database Management System **8 Hrs.**

Introduction to DBMS, Database Models, SQL, Database Design and Data Security, Data Warehouse, Data Mining, Database Administrator

Unit 5 Data Communication and Computer Network **10 Hrs.**

Introduction to communication system, Mode of Communication, Introduction to Computer Network, Types of Computer Network, LAN Topologies, Transmission Media, Network Devices, OSI Reference Model, Communication Protocols, Centralized vs. Distributed System.

Unit 6 Internet and WWW **6 Hrs.**

Internet: Introduction to Internet and its Applications, Connecting to the Internet, Client/Server Technology, Internet as a Client/Server Technology, Email, Video-Conferencing, Internet Service Providers, Domain Name Server, Internet Address, Internet Protocols (IP, TCP, HTTP, FTP, SMTP, POP, Telnet, Gopher, WAIS), Introduction to Intranet, Internet vs. Intranet vs. Extranet, Advantages & Disadvantages of Intranet

World Wide Web (WWW): World Wide Web and Its Evolution, Architecture of Web, Uniform Resource Locator (URL),Browsers: Internet Explorer, Netscape Navigator, Opera, Firefox, Chrome, Mozilla; Search Engine, Web Servers: Apache, IIS, Proxy Server; HTTP Protocol, FTP protocol.

Unit 7 Contemporary Technologies **13 Hrs.**

Multimedia, e-Commerce, e-Learning, e-Governance, e- Banking, Hypermedia, Geographical Information System, Virtual Reality, Augmented Reality, Artificial Intelligence, Ambient Intelligence, Robotics, Bit Coin.

Laboratory Works

Laboratory works should cover all the units and topics mentioned below and a project work should be carried out by students individually implementing the concept and skill learnt in this course.

Unit 1 Operating System **10 Hrs.**

a. **GUI Based OS (5 Hrs.):** Interface, GUI vs. CUI, Introduction to Windows, Features, Elements of Windows, Task Bar, Using Menus and Submenus, Opening a Program, Opening Multiple Program, Using Short Cuts, Using My Computer, Switching off the System, Desktop and Custom Wall Papers, Screen Saver, Using Help for Interactive Learning. Using General Accessories: Notepad, Paint Tool, Clip Board, Character Map, Calculator etc.; Using Multimedia: Using CD/DVD/BD, Using Audio/Video; Using Explorer to Manage Files and Folders: Copy/Delete/Rename/Short Cuts; Recycle Bin and It Uses. Using Format, Scandisk and Disk Defragmenter, Windows Installation and Setting.

b. **CUI Based OS (5 Hrs.):** Introduction to DOS, DOS Internal Commands, DOS External Commands.

Unit 2 Word Processor **12 Hrs.**

Introduction to Word Processor, Features of Word Processor, Elements of Word Window, Creating & Saving Document, Copy Paste and Cut Paste, Format Painter, Undo and Redo, Print Preview, Printing Documents, Fonts, Effect and Character Formatting, Paragraph Formatting, Styles, Finding, Replacing and Selection, Cover Page, Blank Page, Page Break, Working with Table, Inserting Picture, Clip Art, Shapes, Smart Art and Chart, Hyperlink, Bookmarks, Cross-

Referencing, Header, Footer, Page Number, Working with Text Box, Quick Parts, Word Art, Drop Cap, Signature Line, Date & Time, Object, Equation, Symbol, Working with Themes, Page Margins, Page Orientation, Page Size, Columns Handling, Hyphenation, Watermark, Page Color, Page Borders, Indentation, Arranging Objects, Table of Contents, Footnote and Endnote, Citation and Bibliography, Captions, Inserting Index, Table of Authorities, Mail Merge, Spelling and Grammar, Thesaurus, Translation, Word Count, Comments, Tracking, Changes, Compare, Protecting Document, Document Views, Ruler, Gridlines, Document Map, Thumbnails, Zooming, Window Handling, Creating and Using Macro.

Unit 3 Spreadsheet Package **12 Hrs.**

Introduction to Spreadsheet Package, Features of Spreadsheet Package, Introduction to Microsoft Excel, Elements of Excel Window, Cell Referencing in Excel: Relative, Absolute, and Mixed; Managing Workbooks, Worksheets, Windows, Working with Worksheet, Printing Worksheet, Using Formulas/functions; Formatting/Conditional Formatting Data & worksheet; Using Paste Special, Essential Worksheet Functions, Using Templates, Protecting the File and Worksheet with Passwords; Working with Graphic Objects: Clip Art, Word Art, Map; Working with Charts, Working with Internal Database, Getting More Power from Worksheet Databases, Accessing External Databases, Loan Amortization Scheduling and Calculation; Data Validation, Consolidating and Outlining, Using What- if Analysis: Data Table, Goal Seek, Scenario Manager; Understanding Pivot Tables, Constructing and Analyzing Pivot Tables, Using Custom Controls on Worksheets, Effectively Using the Macro Recorder

Unit 4 Presentation Package **6 Hrs.**

Introduction, Creating and Saving Presentation; Entering, Editing, and Enhancing Text; Editing in different views- Outline View, Slide Sorter View; Creating Graphs, Editing and Enhancing Graphs; Adding ClipArt in Slide, Editing Arts, Animating Charts and Art Objects, Adding Sound, Choosing Sound Effects- Transitional, From Other Sources; Adding Sounds to Animations and Sound Objects; Recording Sound and Narration; Adding Movie in Slides, Playing and Editing Movie; Making Movie Poster and Icon; Slide Show, Setting Slide Transition, Speed and Slide Advancement; Rehearsing Slide Display Timing, Slide Notes and Comments; Editing Text Color, Creating Custom Color; Background and Schemes; Linking and Embedding Objects; Importing and Exporting Presentation; Printing Slides and Handouts

Unit 5 Photo Editing Package **20 Hrs.**

Fundamentals

Graphics Basics: Bitmap Vs. Vector-Based Graphics, Color/Bit Depth and Image Resolution, Graphic File Formats, Optimizing Web Graphics, Regular Text Vs.

Anti- Aliased Text, Pixel Resize Vs. Smart Resize, Regular Graphics Vs. Interlaced Graphics, Lossy Compression Vs. Lossless Compression, Dithered Graphics Vs. Non-Dithered Graphics, Standard Selection Vs. Floating Selection, Tolerance, Opacity.

Introduction to Color: Color Modes- RGB, CMYK, Grayscale, LAB, Bitmap; Hue, Saturation, and Brightness; Browser Safe Colors; Shadows, Highlights and Midtones of an Image.

Interface, Tools and Options

Environment: About Photoshop, The Photoshop Interface, Setting up a new Photoshop document, Saving a new document, The Default Palettes, Working with Photoshop Palettes, The Photoshop Toolbox and Options bar, Using Guides and Ruler,

Image and Color Basics: Supported import and export image formats, Opening an Image in Photoshop, Creating Images In Photoshop, Saving Images In Photoshop, Basic Image Editing, Changing Image Size, Cropping an Image, Changing Color/Bit Depth, Optimizing Images using Save for Web, Working with Color in Photoshop

Tools: Parts of the Toolbox, Toolbox Shortcuts, Tools Options, Marquees, Magic wand, Lassos, Move tool, Crop tool, Slice tools, Pencil, Paintbrush, Eraser tools, History brushes, Clone tamp-Pattern stamp, Healing brush tool, Retouch tool, Gradient, Paint bucket, Burn-Dodge-Sponge, Blur-Sharpen-Smudge, Shapes-line- rectangle-polygon-custom shapes, Path selection tool, Pen tool, Type tools, Notes tool-Audio annotation, Eyedropper-Color sampler-Measure tool, Hand-Zoom, Quick mask-Screen modes, Jump to Image Ready, Back ground and Foreground.

Transforms: Using Free transform, Move, Rotate, Scale, Skew, Distort, Perspective, Flip-vertical, horizontal, Invert, Rotate 180°, Rotate 90° CW, Rotate 90° CCW,.

Layers, Channels and Actions

Photoshop Layers: About Layers-Fill and Adjustment Layers, The Layer Palette, Naming Layers, Creating Layers, Deleting Layers, Viewing Layers, Moving Layers, Layer Opacity, Locking Layers, Merging Layers, Layer Modes and Blending Options, Image Composting Using Layers.

Photoshop Channels: About Channels, The Channel Palette, Creating and Viewing Channels, Modifying Channels, Deleting Channels, Alpha Channels and Masks.

Actions: Using the Action Palette, Recording Action, Playing Action, Editing Action, Loading a Saved Action.

Restoring and Enhancing Images

Restoration of Photos: Restoring Damaged Photos, Photo Retouching.

Photo Enhancement and Color Correction: Changing Levels, Changing Curves, Color Balance, Changing Brightness and Contrast, Changing Hue Saturation and Brightness, Changing a Grayscale Image to a Colored Image, Histogram, Gradient Map, Desatuarate, Invert, Color Replace, Selective Color, Equalize, Threshold, Channel Mixer, Posterize, Changing Background using Layer Composting

Text Editing and Special Effects

Text Editing in PhotoShop: About the Type Layer, Creating Vertical and Horizontal Types, Point and Paragraph Text Creation, Using Horizontal and Vertical Type Mask Tools, Using Character Palette for Text Editing, Choosing a Font, Changing the Type Color, Choosing a Type Size, Specifying Kerning and Tracking, Using Fractional Character Widths, Specifying Baseline Shift, Applying Underline and Strikethrough, Text Alignment and Justification, Specifying Anti-Aliasing, Creating Text Warp, Rasterizing Type, Converting Type to Shapes, Adding Effects to Text

Photoshop Special Effects and Filters: About Special Effects, Using Filters, Basic Filter Examples, Artistic Filters, Distorting Filters, Filter Combinations, Plug-in Filters.

Web Application and Animation

Adobe ImageReady: About Image Ready, Opening Image Ready, The Image Ready Interface, Image Maps, Image Slicing, Basic Animation.

Photoshop for Building Web Interface: About the Interface

Teaching Methods

The teaching faculties are expected to create environment where students can update and upgrade themselves with the current scenario of computing and information technology with the help of topics listed in the syllabus. The general teaching pedagogy that can be followed by teaching faculties for this course includes class lectures, group discussions, case studies, guest lectures, research work, project work, assignments (theoretical and practical), and written and verbal examinations.

Evaluation

Examination Scheme				
Internal Assessment		External Assessment		Total
Theory	Practical	Theory	Practical	
20	20 (3 Hrs.)	60 (3 Hrs.)	-	100

Text Books

1 Alexis Leon, Mathews Leon, *"Fundamentals of Information Technology,2/e"*, Vikas Publishing House Pvt Limited, 2009, ISBN: 9788182092457

2 E Balagurusamy, *"Fundamentals of Computers,"* Tata McGraw Hill Education PVT.Ltd., 2009, ISBN: 9780070141605

3 Peter Norton's, *"Introduction to Computers"*, 7th Edition, Tata McGraw-Hill, 2010, ISBN: 9780070671201

Reference Books

1 Brad Dayley & DaNae Dayley, *"Adobe Photoshop CS6 Bible"*, Wiley Publishing Inc., 2012, ISBN: 978-1-118-12388-1

2 Faithe Wempen, *"Microsoft Office Power Point 2007 Bible (With CD)"*, Wiley Publishing Inc., 2007, ISBN: 978-0470043684

3 Herb Tyson, *"Microsoft Office Word 2007 Bible (With CD)"*, Wiley Publishing Inc., 2007

4 Jim Boyce, "Windows 7 *Bible* ", Wiley Publishing Inc., 2009, ISBN: 978-0470509098

5 John Walkenbach, *"Microsoft Office Excel 2007 Bible (With CD)"*, Wiley Publishing Inc., 2007, ISBN: 978-0470044032

6 Pradeep Sinha and Priti Sinha, *"Computer Fundamentals (with CD)"*, 6th Edition, BPB Publications, 2003, ISBN: 9788176567527

7 Ramesh Rimal & et. al., *"Computer Science-I, Revised Edition"*, Buddha Academic Publishers and Distributors Pvt. Ltd. Nepal, 2013

8 Ramesh Rimal & et. al., *"Computer Science-II, Revised Edition"*, Buddha Academic Publishers and Distributors Pvt. Ltd. Nepal, 2013

Course Title: **Society and Technology (3 Cr.)**
Course Code: **CACS102**
Year/Semester: **I/I**
Class Load: **3 Hrs. / Week (Theory: 3 Hrs.)**

Course Description

This course covers several topics of sociology and impact of technology on society that includes basic concept of sociology, organizing social life, social system & social stratification of Nepalese societies, society & technology and research in social sciences which are essential to make computer professionals more responsible towards their society and social norms & values.

Course Objectives

The main objective of this course is to make the students familiar with the disciplines of sociology. The goal is to enable them to analyze the Nepalese society and culture; and to understand the relationship between individual, Society and Culture.

Course Contents

Unit 1 Basic Concept of Sociology **6 Hrs.**

Definition of Sociology, Nature and Scope of Sociology, Relationship of Sociology with Other Social Sciences.

Unit 2 Organizing Social Life **6 Hrs.**

Society: Population size and Distribution, Culture Community, Norms and Values, Status and Role, Institutions: Marriage, Family, Kinship and Groups.

Unit 3 Social System & Social Stratification of Nepalese Societies. **9 Hrs.**

Social Processes & Socialization. Social and Cultural Change in Nepal, Factors of Social and Cultural Change in Nepal, Caste/Ethnicity based Stratification, Gender based Stratification, Religion based Stratification, Ecological based Stratification, National Integration: Historical Process of Nationhood, Cultural Integration (Language, Rituals and Customs).

Unit 4 Society and Technology **12 Hrs.**

Technological Society, Technological Changes in Third World Society, Social and Cultural bases of Technological change, Process and Patterns of Diffusion of Innovation, Consequences of Technological Development on Nepalese Society. Accountability of Computer Professionals towards Society.

Unit 5 Research in Social Science **12 Hrs.**

Concept of Research in Social Science, Understanding the Concept of Research Methods, Techniques and Tools: Interview, Focus Group Discussion, Observation, Qualitative, Quantitative and Mixed Method in Social Research,

Research Proposal and its Components: Identification of Research Problem, Formulation of Objectives, Research Design, Formation of hypothesis/research questions, Sampling design, tool and methods of data collection, Analysis and Presentation of Data, Research Report Writing and Presentation, Computer Softwares on Social Science Research.

Teaching Methods

The general teaching methods includes class lectures, group works and discussions, case studies, guest lectures, research work, project work, assignments and examinations (written and verbal), depending upon the nature of the topics. The teaching faculty will determine the choice of teaching method as per the need of the topics.

Evaluation

Examination Scheme				
Internal Assessment		External Assessment		
Theory	Practical	Theory	Practical	Total
40	-	60 (3 Hrs.)	-	100

Text Books

1. Andersen, M. L. & Taylor, H. F. (2007). Understanding sociology. New Delhi: Cengage Learning India Private Limited.
2. Bista, D.B. (1996). People of Nepal. Kathmandu: Ratna Prakashan
3. Creswell, J. W. (2011). Research design: qualitative, quantitative and mixed methods approach. New Delhi: SAGE
4. Haralambos M & Heald R. M . (2006). Sociology: Themes and perspectives. New Delhi: Oxford University Press

Reference Books

1. Bryman, A. (2008). *Social research methods (3rd ed.)*. New York, New Delhi: Oxford University Press.
2. Central Department of Sociology and Anthropology (1987-2009). *Occasional papers in sociology and anthropology*. Kathmandu.

Course Title: **English I (3 Cr.)**
Course Code: **CACS103**
Year/Semester: **I/I**
Class Load: **4 Hrs. / Week (Theory: 3 Hrs., Tutorial: 1 Hr.)**

Course Description

This course aims at helping students combine the knowledge of the English language with their technical knowledge with special emphasis on vocabulary acquisition and grammatical accuracy. It offers up-to-date technical content, authentic reading and listening passages covering a wide range of topics like the use of virtual reality in industry, personal computing, viruses and security, information systems, and multimedia. Letter-writing section offers a complete guide to writing work-related letters and comprehensive glossary of technical terms forms a useful mini-dictionary of computing terminology.

Course Objectives

The main objectives of the course are to:

- impart effective language skills to students and enable them to use language accurately, clearly and concisely,
- acquaint students with language used in computer study through extensive reading activity,
- help them to enhance their ability to use language in a proper way with specific focus on grammatical accuracy and writing competence,
- enable students to improve work-related letter writing skills with special attention to presentation and structure, and
- familiarize them with innovation in computer science while introducing them with the language used in this field.

Course Contents

A. LEARNING THE LANGUAGE

Unit One

9 Hrs.

I. Personal Computing
The Processor
Language Focus A: Contextual Reference

II. Portable Computers
Operating Systems
Language Focus B: Word formation, prefixes

III. Online Services
Data Transmission
Language Focus C: Word formation, suffixes

Unit Two

I. Computer Software — **12 Hrs.**
Comparing Software Packages
Language Focus D: Making Comparisons

II. Computer Networks
Network Configurations
Language Focus E: Time Sequence

III. Computer in Education
CALL
Language Focus F: Giving Examples

IV. Virtual Reality
VR Input Devices
Language Focus G: Classifying

B. ORGANIZING AND WRITING TEXTS

Unit Three

I. Programming and Languages — **9 Hrs.**
C Languages
Language Focus H: Organizing Information

II. Computer Viruses
Computer Security
Language Focus I: Listing

III. Computers in the Office
Computer System
Language Focus J: The Passive

Unit Four

I. Computers in Medicine — **6 Hrs.**
Data Storage and Management
Language Focus K: Explanations and Definitions

II. Robotics
Robot Characteristics
Language Focus L: Compound Noun

Unit Five

I. Machine Translation — **9 Hrs.**
AI and Expert System
Language Focus M: Cause and Effect

II. Multi Media
Computer-to-video-conversion
Language Focus N: Making Predictions

III. Computer Graphics
24 bit Color
Language Focus O: Letter Writing

Teaching Methods

The course expects communicative language teaching (CLT). Facilitating the learning process, the instructors are expected to stimulate the students to work as per the spirit of the course and make learning a joyful experience.

Evaluation

Internal Evaluation: 40%

Attendance - 5
Presentation/classroom participation- 5
Writing sample- 15
Mid-term test- 15

Final Evaluation- 60%

Comprehension
Vocabulary formation
Grammar testing
Writing of multiple forms

Prescribed Textbook

1. Boeckner, Keith and P. Charles Brown. *Oxford English for Computing*. London: Rutledge, 1993.

Course Title: **Mathematics I (3 Cr.)**
Course Code: **CACS104**
Year/Semester: **I/I**
Class Load: **5 Hrs. / Week (Theory: 3 Hrs., Tutorial: 1 Hr., Practical: 1 Hr.)**

Course Description

This course includes several topics from algebra and analytical geometry such as set theory and real & complex number; relation, functions and graphs; sequence and series; matrices and determinants; permutation & combination; conic section and vector in space which are essential as mathematical foundation for computing.

Course Objectives

The general objective of this course is to provide the students with basic mathematical skills required to understand Computer Application Courses.

Course Contents

Unit 1 Set Theory and Real & Complex Number — 7 Hrs.

Concept, Notation and Specification of Sets, Types of Sets, Operations on Sets (Union, Intersection, Difference, Complement) and their Venn diagrams, Laws of Algebra of Sets (without proof), Cardinal Number of Set and Problems Related to Sets. Real Number System, Intervals, Absolute Value of Real Number. Introduction of Complex Number, Geometrical Representation of Complex Number, Simple Algebraic Properties of Complex Numbers (Addition, Multiplication, Inverse, Absolute Value)

Unit 2 Relation, Functions and Graphs — 8 Hrs.

Ordered pairs, Cartesian product, Relation, Domain and Range of a relation, Inverse of a relation; Types of relations: reflective, symmetric, transitive, and equivalence relations. Definition of function, Domain and Range of a function, Inverse function, Special functions (Identity, Constant), Algebraic (linear, Quadratic, Cubic), Trigonometric and their graphs. Definition of exponential and logarithmic functions, Composite function.(Mathematica)

Unit 3 Sequence and Series — 7 Hrs.

Sequence and Series (Arithmetic, Geometric, Harmonic), Properties of Arithmetic, Geometric, Harmonic sequences, A. M., G. M., and H. M. and relation among them. Sum of Infinite Geometric Series. Taylor's Theorem (without proof), Taylor's series, Exponential series.

Unit 4 Matrices and Determinants — 8 Hrs.

Introductions of Matrices, Types of Matrices, Equality of Matrices, Algebra of Matrices, Determinant, Transpose, Minors and Cofactors of Matrix. Properties of determinants (with out proof), Singular and non-singular matrix, adjoin and

inverse of matrices.Linear transformations, orthogonal transformations; rank of matrices. (Matlab)

Unit 5 Analytical Geometry **8 Hrs.**

Conic Sections: Definitions (Circle, Parabola, Ellipse, Hyperbola and Related Terms), Examples to Explain The Defined Terms, Equations and Graphs of The Conic Sections Defined Above, Classifying The Defined Conic Sections by Eccentricity and Related Problems, Polar Equations of Lines, Circles, Ellipse, Parabolas, and Hyperbolas. (Mathematica / Matlab)

Vectors in Space: Vectors in Space, Algebra of Vectors in Space, Length, Distance Between Two Points, Unit Vector, Null Vector. Scalar Product, Cross Product of Two and Three Vectors and Their Geometrical Interpretations and Related Examples. (Matlab)

Unit 6 Permutation and Combination **7 Hrs.**

Basic Principle of Counting, Permutation of a. Set of Objects All Different b. Set of Objects Not All Different c. Circular Arrangement d. Repeated Use of The Same Object. Combination of Things All Different, Properties of Combination.

Laboratory Works

Mathematica and/ or Matlab should be used for above mentioned topics.

Teaching Methods

The general teaching pedagogy includes class lectures, group works, case studies, guest lectures, research work, project work, assignments (theoretical and practical), tutorials and examinations (written and verbal). The teaching faculty will determine the choice of teaching pedagogy as per the need of the topics.

Evaluation

Examination Scheme				
Internal Assessment		External Assessment		
Theory	Practical	Theory	Practical	Total
20	20 (3 Hrs.)	60 (3 Hrs.)	-	100

Text Book

1. Thomas, G. B, Finney, R. S., *"Calculus with Analytic Geometry"*, Addison - Wesley, 9th Edition.

Reference Books

1. Bajracharya D. R., Shreshtha, R. M. & et al, "*Basic Mathematics I, II*" Sukunda Pustak Bhawan, Nepal
2. Budnick, F. S., "*Applied Mathematics for Business, Economics and the Social Sciences*", McGraw-Hill Ryerson Limited.
3. Monga, G. S., "*Mathematics for Management and Economics*", Vikas Publishing House Pvt. Ltd., New Delhi.
4. Paudel, K. C., GC. F. B., and et. al, "*Higher Secondary Mathematics*", Asmita Publication & Distributors Pvt. Ltd, Nepal.
5. Upadhayay, H. P., Paudel, K.C & et al, "*Elements of Business Mathematics*", Pinnacle Publication.
6. Yamane, T. "*Mathematics for Economist*", Prentice-hall of India.

Course Title: **Digital Logic (3 Cr.)**
Course Code: **CACS105**
Year/Semester: **I/I**
Class Load: **5 Hrs. / Week (Theory: 3 Hrs, Practical: 2 Hrs.)**

Course Description

This course presents an introduction to Digital logic techniques and its practical application in computer and digital system.

Course Objectives

The course has the following specific objectives:

- To perform conversion among different number systems
- To simplify logic functions
- To design combinational and sequential logic circuit
- To understand industrial application of logic system.
- To understand Digital IC analysis and its application
- Designing of programmable memory

Course Contents

Unit 1 Introduction **2 Hrs.**

1.1 Digital Signals and Wave Forms
1.2 Digital Logic and Operation
1.3 Digital Computer and Integrated Circuits (IC)
1.4 Clock Wave Form

Unit 2 Number Systems **5 Hrs.**

2.1 Binary, Octal, & Hexadecimal Number Systems and Their Conversions
2.1.1 Representation of Signed Numbers-Floating Point Number
2.1.2 Binary Arithmetic
2.2 Representation-of BCD-ASCII-Excess 3 -Gray Code –Error Detecting and Correcting Codes.

Unit 3 Combinational Logic Design **16 Hrs.**

3.1 Basic Logic Gates NOT, OR and AND
3.2 Universal Logic Gates NOR and NAND
3.3 EX-OR and EX-NOR Gates
3.4 Boolean Algebra:
3.3.1 Postulates & Theorems
3.3.2 Canonical Forms - Simplification of Logic Functions
3.5 Simplification of Logic Functions Using Karnaugh Map.
3.5.1 Analysis of SOP And POS Expression
3.6 Implementation of Combinational Logic Functions
3.6.1 Encoders & Decoders

3.6.2 Half Adder, & Full Adder

3.7 Implementation of Data Processing Circuits

3.7.1 Multiplexers and De-Multiplexers

3.7.2 Parallel Adder -Binary Adder-Parity Generator /Checker-Implementation of Logical Functions Using Multiplexers.

3.8 Basic Concepts of Programmable Logic

3.8.1 PROM

3.8.2 EPROM

3.8.3 PAL

3.8.4 PLA

Unit 4 Counters & Registers **16 Hrs.**

4.1 RS, JK, JK Master - Slave, D & T Flip flops

4.1.1 Level Triggering and Edge Triggering

4.1.2 Excitation Tables

4.2 Asynchronous and Synchronous Counters

4.2.1 Ripple Counter: Circuit and State Diagram and TimingWaveforms

4.2.2 Ring Counter: Circuit and State Diagram and Timing Waveforms

4.2.3 Modulus 10 Counter: Circuit and State Diagram and Timing Waveforms

4.2.4 Modulus Counters (5, 7, 11) and Design Principle, Circuit and State Diagram

4.2.5 Synchronous Design of Above Counters, Circuit Diagrams and State Diagrams

4.3 Application of Counters

4.3.1 Digital Watch

4.3.2 Frequency Counter

4.4 Registers

4.4.1 Serial in Parallel out Register

4.4.2 Serial in Serial out Register

4.4.3 Parallel in Serial out Register

4.4.4 Parallel in Parallel out Register

4.4.5 Right Shift, Left Shift Register

Unit 5 Sequential Logic Design **6 Hrs.**

5.1 Basic Models of Sequential Machines

- Concept of State
- State Diagram

5.2 State Reduction through Partitioning and Implementation of Synchronous Sequential Circuits

5.3 Use of Flip-Flops in Realizing the Models

5.4 Counter Design

Laboratory Works

1. Gates using Active and Passive Elements
2. Half Adder and Full Adder
3. 16:1 Multiplexer
4. 1:16 Demultiplexer
5. Digital Watch by Counters
6. Shift Resistors

Teaching Methods

The general teaching methods includes class lectures, group discussions, case studies, guest lectures, research work, project work, assignments (theoretical and practical), and exams, depending upon the nature of the topics. The teaching faculty will determine the choice of teaching pedagogy as per the need of the topics.

Evaluation

Examination Scheme				
Internal Assessment		External Assessment		Total
Theory	Practical	Theory	Practical	
20	20 (3 Hrs.)	60 (3 Hrs.)	-	100

Text Books

1. Floyd,"*Digital Fundamentals*", PHI.
2. Morris Mano, "*Digital Design*", Prentice Hall of India.
3. Tocci.R.J, "*Digital systems-Principles & Applications*"-Prentice Hall of India.

Reference Books

1. B. R. Gupta and V.Singhal, "*Digital Electronics*" 4th Edition, S.K Kataria & sons, India.
2. Fletcher.W.I., "*An Engineering Approach to Digital Design*", Prentice Hall of India.
3. Millman & Halkias ,"Integrated Electronics".
4. V.K.PURI, "*Digital Electronics*", TMH.

Course Title: **C Programming (4 Cr.)**
Course Code: **CACS151**
Year/Semester: **I/II**
Class Load: **8 Hrs. / Week (Theory: 4 Hrs, Tutorial: 1 Hr., Practical: 3 Hrs)**

Course Description

This course includes both theoretical as well as practical concept of programming. Practical skill of programming are provided using C language which includes basic concept of C, operators and expressions, basic input/output function, control structures, array & string, function, pointer, structure and union, file handling and graphics in C.

Course Objectives

The general objectives of this course are to provide fundamental concepts of programming language, programming technique and program development using C programming language.

Course Contents

Unit 1 Programming Language **10 Hrs.**

Introduction to Programming Language, Types of Programming Language, Language Processor, Program Errors, Features of Good Program, Different Programming Paradigm, Software Development Model, Program Development Life Cycle, System Design Tools.

Unit 2 Programming Technique **5 Hrs.**

Introduction to Programming Technique, Top down & Bottom up Approach, Cohesion and Coupling, Structured Programming, Deterministic and Non-deterministic Technique, Iterative and Recursive Logic, Modular Designing & Programming.

Unit 3 Basic Concept of C **5 Hrs.**

Introduction, History, Features, Advantages and Disadvantages, Structure of C program, Compiling Process, C Preprocessor and Header Files, Library Function, Character Set, Comments, Tokens and its types, Data types, Escape Sequences, Preprocessors Directives.

Unit 4 Operators and Expressions **3 Hrs.**

Arithmetic Operator, Relational Operator, Logical Operator, Assignment Operator, Increment/decrement Operator, Conditional Operator, Bitwise Operator, Comma Operator, Sizeof Operator, Operator Precedence and Associativity, Expressions and its Evaluation, Type Casting in Expression, Program Statement.

Unit 5 Input and Output **3 Hrs.**

Input/Output Operation, Formatted I/O (scanf, printf), Unformatted I/O (getch-putch, getche, getchar-putchar and gets-puts)

Unit 6 Control Structure **6 Hrs.**

Introduction, Type of Control Structure (Branching:if, if else, if elseif and switch case, Looping: while, do while and for and Jumping: goto, break and continue), Nested Control Structure.

Unit 7 Array **6 Hrs.**

Introduction, Declaration, Initialization, One Dimensional Array, Multi Dimensional Array, Sorting (Bubble, Selection), Searching Sequential), String Handling.

Unit 8 User Defined Function **5 Hrs.**

Introduction, Components, Function Parameters, Library Function vs. Users Defined Function, Different Forms of Function, Recursion, Passing Array to Function, Passing String to Function, Accessing a function (Call By Value & Call By Reference), Macros, Storage Class.

Unit 9 Pointer **6 Hrs.**

Introduction, The Address(&) and Indirection(*) Operators, Declaration & Initialization, Pointer to Pointer, Pointer Expressions, Pointer Arithmetic, Passing Pointer to a Function, Pointer and Array, Array of Pointer, Pointer and String, Dynamic Memory Allocation.

Unit 10Structure **5 Hrs.**

Introduction, Declaration, Initialization, Nested Structure, Array of structure, Array within Structure, Passing Structure & Array of Structure to function, Structure & Pointer, Bit Fields, Union and Its Importance, Structure vs. Union.

Unit 11Data File Handling **4 Hrs.**

Introduction, Types of File, Opening & Closing Data File, Read & Write Function, Writing & Reading Data To and From Data File, Updating Data File, Random Accessing Files, Printing a File.

Unit 12Introduction to Graphics **2 Hrs.**

Initialization, Graphical Mode, Graphical Functions.

Laboratory Works

Laboratory works should be done covering all the topics listed above and a small project work should be carried out using the concept learnt in this course only. Project should be assigned on individual basis.

Teaching Methods

The general teaching pedagogy includes class lectures, group discussions, case studies, guest lectures, research work, project work, assignments (theoretical and practical), and examinations (written and verbal), depending upon the nature of the topics. The teaching faculty will determine the choice of teaching pedagogy as per the need of the topics.

Evaluation

Examination Scheme				
Internal Assessment		External Assessment		Total
Theory	Practical	Theory	Practical	
20	20 (3 Hrs.)	60 (3 hrs.)	-	100

Text Books

1. Brain W. Kerighan & Dennis Ritchie, "*The C Programming Language*", Second Edition, Prentice Hall, 1988, ISBN: 978-0131103627
2. Byrons S. Gotterfried, "*Programming with C, 3/e* ", McGraw Hill Education India, 2013, ISBN: 978-0-07-014590-0

Reference Books

3. Al Kelley, Ira Pohl, "*A Book on C*", 4th Edition, Pearson Education, 1998, ISBN: 978-0201183993
4. Deitel & Deitel, "*C: How to program*", 7th Edition, Pearson Education, 2012, ISBN: 9780273776840
5. E Balagurusamy, "*Programming in ANSI C, Sixth Edition*", Tata Mc GrawHill, 2012 ISBN: 9781259004612
6. Yeshvant Kanetkar, "*Let us C*", 13th Edition, BPB Publication,2013, ISBN: 978-81-8333-163-0
7. Ramesh Rimal & et. al., "*Computer Science-II, Revised Edition*", Buddha Academic Publishers and Distributors Pvt. Ltd. Nepal, 2013

Course Title: **Financial Accounting (3 Cr.)**
Course Code: **CACS152**
Year/Semester: **I/II**
Class Load: **5 Hrs. / Week (Theory: 3 Hrs, Tutorial: 1 Hr., Practical: 1 Hr.)**

Course Description

This course includes both theoretical as well as practical concept of financial accounting so that students can understand working principle of financial accounting and hence can use the concept in developing application related to financial sector.

Course Objectives

The general objective of this course is to develop conceptual understanding of the fundamentals of financial accounting system.

Course Contents

Unit 1 Theoretical Framework **4 Hrs.**

Meaning and Scope of Accounting: Meaning of Accounting, Procedural Aspects of Accounting, Evolution of Accounting as a Social Science, Objectives of Accounting, Functions of Accounting, Sub-fields of Accounting, Users of Accounting Information, Relationship of Accounting with Other Disciplines, Limitation of Accounting, Role of Accountant in the Society.

Accounting Concepts, Principles and Conventions: Accounting Concepts, Principles & Conventions – an Overview, Qualitative Characteristics of Financial Statements, Fundamentals Accounting Assumptions.

Accounting Standards: Concepts, Objectives, Benefits & An Overview of Nepal Accounting Standards

Accounting Policies: Meaning, Selection of Accounting Policies and Changes in Accounting Policies

Unit 2 Accounting Process **10 Hrs.**

Books Of Accounts Leading to The Preparation of Trial Balance, Journal Entries, Double Entry System, Advantage of Double Entry System, Concepts of Transaction and Events, Classification of Accounts, Golden Rules of Accounting, Advantages of Journal, Ledger, Trial Balance, Subsidiary Books Including Cash Books, Capital and Revenue Expenditures and Receipts, Contingent Assets and Contingent Liabilities, Errors Including Rectifications Thereof.

Unit 3 Bank Reconciliation Statement **4 Hrs.**

Introductions, Ascertaining the Causes of Differences of Bank Balance in Bank. Column of the Cash-Book and in Pass- Book, Procedure for Reconciling the Cash- Book Balance with the Pass-Book Balance, Importance of Bank Reconciliation Statement.

Unit 4 Depreciation Accounting **4 Hrs.**

Concepts of Depreciation, Objectives for Providing Depreciation, Methods for Providing Depreciation, Accounting for Depreciation

Unit 5 Inventories **4 Hrs.**

Meaning, Basis and Technique of Inventory Valuation, Inventory Recording System, Stock Taking

Unit 6 Preparation of Final Accounts for Sole Proprietors **10 Hrs.**

Concept of Closing Entries in respect of Trading and Profit & Loss Account, Concept of Accrual Basis of Accounting, Matching Concept and Dual Aspects, Concept on Manufacturing Account, Preparation of Balance Sheet, Arrangement and Classification of Assets and Liabilities

Unit 7 Introduction to Company Accounts **9 Hrs.**

Meaning of Company, Salient Features of Company, Types of Company, Preparation of Financial Statements, Share Capital and its types, Debentures and its types, Distinction between Debentures and Shares, Issue of Shares and Debentures, Redemption of Preference Shares

Laboratory Works

Laboratory works should be carried out using any accounting packages (such as Tally, Fact etc.) to implement the concepts discussed in the above mentioned topics.

Teaching Methods

The general teaching pedagogy includes class lectures, group discussions, case studies, guest lectures, research work, project work, assignments (theoretical and practical), tutorials and examinations (written and verbal), depending upon the nature of the topics. The teaching faculty will determine the choice of teaching pedagogy as per the need of the topics.

Evaluation

Examination Scheme				
Internal Assessment		External Assessment		Total
Theory	Practical	Theory	Practical	
20	20 (3 Hrs.)	60 (3 Hrs.)	-	100

Text Book

1. Andrew Thomas & Anne Marie Ward, "*Introduction to Financial Accounting 7/e*", Mc Graw Hill 2012 ISBN: 9780077132682

Reference Books

1. Narayanaswamy, R., "*Financial Accounting: A Managerial Perspective*", Prentice Hall of India, New Delhi.
2. Porter, Gary A. Norton, Curtis L., "*Financial Accounting: The Impact on Decision Makers*", The Dryden Press, USA.

Course Title: **English II (3 Cr.)**
Course Code: **CACS103**
Year/Semester: **I/II**
Class Load: **4 Hrs. / Week (Theory: 3 Hrs., Tutorial: 1 Hr.)**

Course Description

The course consists of literary reading, business communication skills along with critical reasoning to inculcate cognitive ability and workplace communicative competence in the students. It consists of science fiction stories, business writing and exercises based on critical reasoning. The course aims to enhance language proficiency and stimulate creative and critical thinking and analysis.

Course Objectives

The course has following specific objectives:

- To impart reading skills in students and make them comprehend and analyze literary texts.
- To frame students' logical capability including analyzing reasoning, assessing credibility, making sound decisions and solving dilemmas.
- To help students to develop confidence and expertise in composing effective professional documents.

Course Contents

Unit1 Science Fiction Stories **10 Hrs.**

1. H. G. Wells: "The Land Ironclads"
2. Jack Williamson: "The Metal Man"
3. Brian Aldiss: "Who can Replace a Man?"
4. J. G. Ballard: "Billenium"
5. William Gibson: "Burning Chrome"

Unit2 Business Communication **9 Hrs.**

1. Rules of Good Writing
2. Fax Message and Electronic Mails
3. Memos, Reports and Meetings

Unit3 Persuasive Communication **3 Hrs.**

1. Notices, Advertisements and Leaflets

Unit4 Oral Communication **3 Hrs.**

1. Oral Presentation Skills

Unit5 Critical Reasoning **20 Hrs.**

1. Analyzing Reasoning
2. Evaluating Reasoning

3. Reasoning Implications
4. Evaluating Evidence and Authorities
5. Two Skills in the Use of Language
6. Exercising the skills of Reasoning
7. Constructing Reasoning

Teaching Methods

The course expects students' effective participation and instructors' proper guidance to fulfill the objectives of the course. The teacher should engage students in language activities and minimize lectures. Student centered teaching method will engage students in the pursuit of learning and bring about positive results.

Evaluation

Internal Evaluation: 40%

Attendance - 5
Presentation/classroom participation- 5
Writing sample- 15
Mid-term test- 15

Final Evaluation: 60%

Critical response on stories
Business writing tasks
Logical reasoning activities

Text Books

1. Shippey, Tom. *The Oxford Book of Science Fiction Stories*. London: OUP, 2003.
2. Taylor, Shirley. *Communication for Business: A Practical Approach*. London: Longman, 2005.
3. Thompson, Anne. *Critical Reasoning: A Practical Introduction*. New York: Rutledge, 2009.

Course Title: **Mathematics II (3 Cr.)**
Course Code: **CACS154**
Year/Semester: **I/II**
Class Load: **5 Hrs. / Week (Theory: 3 Hrs, Tutorial: 1 Hr., Practical: 1 Hrs)**

Course Description

This course includes the topics from calculus and computational methods such as limits and continuity, differentiation & its applications, integration and its applications, differential equation and different computational techniques which are essential as mathematical foundation for computing.

Course Objectives

This course makes students able to cognize the concept Calculus, Computational methods and their applications in the area of Social Science and Computer Application.

Course Contents

Unit 1 Limits and Continuity — 6 Hrs.

Limit of a function, Indeterminate forms, Algebraic properties of limit (without proof), Theorems on Limits of Algebraic and Transcendental Function. Continuity of a function, types of discontinuity. Exercises on evaluation of limits and test of continuity. (Methematica)

Unit 2 Differentiation — 6 Hrs.

Ordered Pairs, Cartesian Product, Relation, Domain and Range of a Relation, Inverse of a Relation; Types of Relations: Reflective, Symmetric, Transitive, and Equivalence Relations. Definition of Function, Domain and Range of a Function, Inverse function, Special Functions (Identity, Constant), Algebraic (Linear, Quadratic, Cubic), Trigonometric and Their Graphs. Definition of Exponential and Logarithmic functions, Composite Function. (Mathematica)

Unit 3 Application of Differentiation — 8 Hrs.

The derivatives and slope of the curve; Increasing and decreasing function; convexity of curves; maximization and minimization of a function; Differentiation and marginal analysis; price and output; Competitive equilibrium of firm, Illustrations. Drawing graphs of algebraic function by using first and second order derivatives. (Mathematica)

Unit 4 Integration and Its Applications — 8 Hrs.

Riemann Integral; Fundamental Theorem (Without Proof); Technique of Integration; Evaluation and Approximation of Definite Integrals; Improper Integrals; Applications of Definite Integrals; Quadrate, Rectification; Volume and Surface Integral. Trapezoidal and Simpson's Rules of Numerical Integration.(Mathematica)

Unit 5 Differential Equations **7 Hrs.**

Differential Equation and its Order and Degree, Differential Equations of First Order and First Degree; Differential Equations with Separable Variables, Homogeneous and Exact Differential Equations.

Unit 6 Computational Method **10 Hrs.**

Linear Programming Problem (LPP), Graphical Solution of LPP in Two Variables, Solution of LPP by Simplex Method (up to 3 variables), Solution of System of Linear Equations by Gauss Elimination Method, Gauss Seidel Method and Matrix Inversion Method, Bisection method, Newton- Raphson Method for Solving Non-linear Equations. (Excel/Matlab)

Laboratory Works

Mathematica and/ or Matlab should be used for above mentioned topics.

Teaching Methods

The general teaching pedagogy includes class lectures, group works, case studies, guest lectures, research work, project work, assignments (theoretical and practical), tutorials and examinations (written and verbal). The teaching faculty will determine the choice of teaching pedagogy as per the need of the topics.

Evaluation

Examination Scheme				
Internal Assessment		External Assessment		
Theory	Practical	Theory	Practical	Total
20	20 (3 Hrs.)	60 (3 Hrs.)	-	100

Text Book

1. Thomas, G. B, Finney, R. S., "*Calculus with Analytic Geometry*", Addison - Wesley, 9th Edition.

Reference Books

1. Monga, G. S., "*Mathematics for Management and Economics*", Vikas Publishing House Pvt. Ltd., New Delhi.
2. Upadhayay, H. P., Paudel, K.C & et al, "*Elements of Business Mathematics*", Pinnacle Publication.
3. Budnick, F. S., "*Applied Mathematics for Business, Economics, and the Social Sciences*", McGraw-Hill Ryerson Limited.

4. Paudel, K. C., GC. F. B., and et al, "*Higher Secondary Mathematics*", Asmita Publication & Distributors Pvt. Ltd, Nepal.
5. Bajracharya D. R., Shreshtha, R. M. & et al, "*Basic Mathematics I, II*", Sukunda Pustak Bhawan, Nepal
6. Sthapit, A.B., Bajracharya, P. M. and et al, "*Fundamentals of Business Mathematics*", Buddha Academic Publisheres & Distributors Pvt. Ltd., Nepal
7. Yamane, T. "*Mathematics for Economist*", Prentice-hall of India.
8. Snedden. I., "*Elements of Partial Differential Equation*", Hill Book Company-McGraw.

Course Title: **Microprocessor and Computer Architecture (3 Cr.)**
Course Code: **CACS155**
Year/Semester: **I/II**
Class Load: ***6 Hrs. / Week (Theory: 3 Hrs, Tutorial: 1 Hr., Practical: 2 Hrs.)***

Course Description

This course is an introduction to microprocessor and computer architecture. It covers topics in both the physical design of the computer (organization) and the logical design of the computer (architecture).

Course Objectives

The course has following specific objectives:

- To explain the microprocessor.
- To explain the assembly language programming.
- To explain the overview of computer organization.
- To explain the principle of CPU system.
- To explain the principle of memory system
- To explain the principle of data flow.

Course Contents

Unit 1 Fundamental of Microprocessor **5 Hrs.**

Introduction to Microprocessors, Microprocessor systems with bus organization, Microprocessor architecture and operation, 8085 Microprocessor and its operation, 8085 instruction cycle, machine cycle, T states, Addressing modes in 8085, Introduction to 8086.

Unit 2 Introduction To Assembly Language Programming **10 Hrs.**

Assembly Language Programming Basics, Classification of Instructions and Addressing Mode, 8085 Instruction Sets, Assembling, Executing and Debugging the Programs, Developing Counters and Time Delay Routines, Interfacing Concepts

Unit 3 Basic Computer Architecture **4 Hrs.**

Introduction: History of computer architecture, Overview of computer organization, Memory Hierarchy and cache, Organization of hard disk.

Instruction Codes: Stored Program Organization-Indirect Address, Computer Registers, Common bus system, Instruction set, Timing and Control-Instruction Cycle

Unit 4 Microprogrammed Control **10 Hrs.**

Basic Computer Design of Accumulator: Control of AC Register, ALU Organization; Control Memory-Address Sequencing: Conditional Branching, Mapping of Instruction-Subroutines; Micro Program: Symbolic Micro

Program, Binary Micro Program; Design of Control Unit: Basic Requirement of Control Unit, Structure of Control Unit, Micro Program Sequencer.

Unit 5 Central Processing Unit **10 Hrs.**

General Register Organization: Control Word, Stack Organization and Instruction; Formats-Addressing Modes.

Data Transfer and Manipulation: Data Transfer Instructions, Data Manipulation Instructions, Arithmetic Instructions, Logical and Bit Manipulation Instructions, Shift Instructions.

Program Control: Status Bit Conditions, Conditional Branch Instructions, Subroutine Call and Return, Program Interrupt, Types of Interrupts

Unit 6 Pipeline, Vector Processing and Multiprocessors **6 Hrs.**

Parallel Processing, Pipeline Examples: Four Segment Instruction Pipeline, Data Dependency, Handling of Branch Instructions; Vector Processing: Vector operations, Matrix Multiplication;

Laboratory Works

8085 Assembly Language program

1. Multi byte Addition & Subtraction, Multi byte decimal addition & subtraction.
2. Adder and substractor circuit.
3. Study of 8259 programmable interrupt controller - Development of interrupt service routine.
4. Keyboard/display controller - Keyboard scan - blinking and rolling display.
5. Parallel data transfer
6. Study of Microcomputer development system.

Teaching methods

The general teaching pedagogy includes class lectures, group works, case studies, guest lectures, research work, project work, assignments (theoretical and practical), tutorials and examinations (written and verbal). The teaching faculty will determine the choice of teaching pedagogy as per the need of the topics.

Evaluation

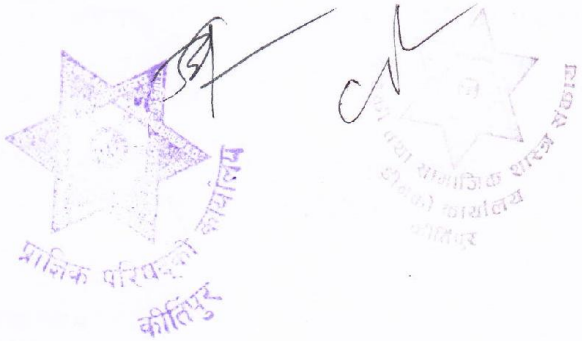
Examination Scheme				
Internal Assessment		External Assessment		
Theory	Practical	Theory	Practical	Total
20	20 (3 Hrs.)	60 (3 Hrs.)	-	100

Text Book

1. Morris Mano.M., Computer System architecture, PIII.

Reference Books

1. Hamacher.V.C.,Vranesic.Z.G and Zaky.S.G., "*Computer Organisation*", McGraw Hill, New York.
2. Hayes,"*Computer System Architecture*",Mc Graw Hill.



Course Title: **Data Structures and Algorithms (3 Cr.)**
Course Code: **CACS201**
Year/Semester: **II/III**
Class Load: 6 **Hrs. / Week (Theory: 3 Hrs., Practical: 3 Hrs.)**

Course Description

This course includes fundamental concept of data structures such as stack, queue, list, linked list, trees and graph; application of these data structures along with several algorithms.

Course Objectives

The general objective of this course is to provide fundamental concepts of data structures, different algorithms and their implementation.

Course Contents

Unit 1 Introduction to data structure **2 Hrs.**

Definition, Abstract Data Type, Importance of Data structure.

Unit 2 The Stack **3 Hrs.**

Introduction, Stack as an ADT, POP and PUSH Operation, Stack Application: Evaluation of Infix, Postfix, and Prefix Expressions, Conversion of Expression.

Unit 3 Queue **3 Hrs.**

Introduction, Queue as an ADT, Primitive Operations in Queue, Linear and Circular Queue and Their Application, Enqueue and Dequeue, Priority Queue

Unit 4 List **2 Hrs.**

Introduction, Static and Dynamic List Structure, Array Implementation of Lists, Queues as a List

Unit 5 Linked Lists **5 Hrs.**

Introduction, Linked List as an ADT, Dynamic Implementation, Insertion & Deletion of Node To and From a List, Insertion and Deletion After and Before Nodes, Linked Stacks and Queues, Doubly Linked Lists and Its Advantages

Unit 6 Recursion **4 Hrs.**

Introduction, Principle of Recursion, Recursion vs. Iteration, Recursion Example: TOH and Fibonacci Series, Applications of Recursion, Search Tree

Unit 7 Trees **5 Hrs.**

Introduction, Basic Operation in Binary tree, Tree Search and Insertion/Deletion, Binary Tree Traversals (pre-order, post-order and in-order), Tree Height, Level, and Depth, Balanced Trees: AVL Balanced Trees, Balancing Algorithm, The Huffman Algorithm, Game tree, B-Tree

Unit 8 Sorting **5 Hrs.**

Introduction, Internal and External Sort, Insertion and Selection Sort, Exchange Sort, Bubble and Quick Sort, Merge and Radix Sort, Shell Sort, Binary Sort, Heap Sort as Priority Queue, Efficiency of Sorting, Big 'O' Notation

Unit 9 Searching **5 Hrs.**

Introduction to Search Technique; essential of search, Sequential search, Binary search, Tree search, General search tree, Hashing: Hash function and hash tables, Collision resolution technique, Efficiency comparisons of different search technique

Unit 10Graphs **5 Hrs.**

Introduction, Graphs as an ADT, Transitive Closure, Warshall's Algorithm, Types of Graph, Graph Traversal and Spanning Forests, Kruskal's and Round-Robin Algorithms, Shortest-path Algorithm, Greedy Algorithm, Dijkstra's Algorithm

Unit 11Algorithms **5 Hrs.**

Deterministic and Non-deterministic Algorithm, Divide and Conquer Algorithm, Series and Parallel Algorithm, Heuristic and Approximate Algorithms

Laboratory Works

There shall be 10 lab exercises based on C or Java

1. Implementations of different operations related to Stack
2. Implementations of different operations related to linear and circular queues
3. Solutions of TOH and Fibonacci Series using Recursion
4. Implementations of different operations related to linked list: singly and doubly linked
5. Implementation of trees: AVL trees, Balancing of AVL
6. Implementation of Merge sort
7. Implementation of different searching technique: sequential, Tree and Binary
8. Implementation of Graphs: Graph traversals
9. Implementation of Hashing
10. Implementations of Heap

Teaching Methods

The general teaching pedagogy includes class lectures, group discussions, case studies, guest lectures, research work, project work, assignments (theoretical and practical), and examinations (written and verbal), depending upon the nature of the topics. The teaching faculty will determine the choice of teaching pedagogy as per the need of the topics.

Evaluation

Examination Scheme				
Internal Assessment		External Assessment		
Theory	Practical	Theory	Practical	Total
20	20 (3 Hrs.)	60 (3 hrs.)	-	100

Text Book

1. Y. Langsam, M.J. Augenstein and A. M. Tenenbaum, "*Data Structures using C and C++*", PHI

Reference Books

1. G. W. Rowe, "*Introduction to Data Structure and Algorithms with C and C++*", PHI
2. Robert Lafore, *Data Structures and Algorithms in Java (2nd Edition)*, Sams Publishing.

Course Title: **Probability & Statistics (3 Cr.)**
Course Code: **CACS202**
Year/Semester: **II/III**
Class Load: **5 Hrs. / Week (Theory: 3 Hrs, Tutorial: 1 Hr., Practical: 1 Hr.)**

Course Description

This course covers basic concept of statistics, measurement of central tendency, correlation & regression analysis, probability, sample survey, sample survey methods and design of experiment. These topics are essential tools for research.

Course Objective

The general objectives of this course are to provide fundamental concept of Statistics, Probability, Sample Survey and their applications in the area of Social Science and Computer Application.

Course Contents

Unit 1 Introduction to Statistics — 3 Hrs.

Meaning, Scope and Limitations of Statistics, Types and Sources of Data, Methods and Problems of Collection of Primary and Secondary Data.

Unit 2 Descriptive Statistics — 6 Hrs.

Measure of Central Tendency (Arithmetic Mean, Median, Partition Values, Mode); Measure of Dispersion (Absolute and Relative Measures: Range, Quartile Deviation, Mean Deviation, Standard Deviation, and Coefficient of Variation)

Unit 3 Correlation and Regression Analysis — 6 Hrs.

Correlation: Definition, Scatter diagram, Karl Pearson's coefficient of correlation, Numerical problems for determination of Correlation Coefficients.

Regression: Definition, Dependent and Independent Variables, Least Square method only, Numerical Problems.

Unit 4 Probability — 8 Hrs.

Definition of Probability, Two basic Laws of Probability(without proof), Conditional Probability; Probability Distributions (Binomial, Poisson and Normal); simple numerical problems.

Unit 5 Sample Survey — 6 Hrs.

Concept of Population and Sample; Needs of Sampling; Censuses and Sample Survey; Basic Concept of Sampling; Organizational Aspect of Sample Survey; Questionnaire Design; Sample Selection and Determination of Sample Size; Sampling and Non Sampling Errors.

Unit 6 Sample Survey Methods — 10 Hrs.

Types of Sampling; Simple Random Sampling with and without Replacement;

Stratified Random Sampling; Ratio and Regression Method of Estimation under Simple and Stratified Random Sampling; Systematic Sampling; Cluster Sampling; Multistage Sampling; Probability Proportion to Size Sampling (PPS), Estimation of Population Total and its Variance. Sampling Distributions (t, x^2, z) and Related Problems.

Unit 7 Design of Experiment **6 Hrs.**

Concept of Analysis of Variance (ANOVA), F -Statistic and its Distribution, Linear Model in ANOVA, Analysis of One Way, Two Way Classification (1 and m observations per cell) in Fixed Effect Model.

Laboratory Works

Techniques for using the computer as a tool in the analysis of statistical problems will be introduced. SPSS software should be used for data analysis

Teaching Methods

The general teaching pedagogy includes class lectures, group discussions, case studies, guest lectures, research work, project work, assignments (theoretical and practical), and examinations (written and verbal), depending upon the nature of the topics. The teaching faculty will determine the choice of teaching pedagogy as per the need of the topics.

Evaluation

Examination Scheme				
Internal Assessment		External Assessment		Total
Theory	Practical	Theory	Practical	
20	20 (3 Hrs.)	60 (3 Hrs.)	-	100

Text Books

1. Mukhopadhyay P., "*Theory and Methods of Survey Sampling*", Prentice Hall of India, New Delhi, 1998.
2. Sheldon M. Ross, "*Introduction to Probability and Statistics for Engineers and Scientists*", 3rd Edition, India, Academic Press, 2005.

Reference Books

1. Cochran W.G., "*Sampling Techniques*", 3rd edition, John Wiley and Sons, Inc. New York, 1977.

2. Hoggg & Tanis, "*Probability and Statistical Inference*", 6th edition, First Indian Reprint, 2002
3. Montgomery Douglas C., "*Design and Analysis of Experiments*", 5th edition, John Wiley & Sons Inc., 2001.
4. Upadhayay, H. P., Paudel, K.C & et al, "*Elements of Business Mathematics*", Pinnacle Publication.

Course Title: **System Analysis and Design (3 Cr.)**
Course Code: **CACS203**
Year/Semester: **II/III**
Class Load: **4 Hrs. / Week (Theory: 3 Hrs, Tutorial: 1 Hr.)**

Course Description

This course mainly focuses on different aspect of system analysis and design such as foundation, planning, analysis, design, implementation and maintenance.

Course Objectives

The general objective of this course is to provide concepts related to information systems development in a systematic approach including foundations, planning, analysis, design, implementation and maintenance.

Course Contents

Unit 1 System Development Fundamentals — 9 Hrs.

a. The Systems Development Environment

Introduction, Modern Approach of System Analysis and Design, Information System and its Type, Developing Information Systems and the Systems Development Life Cycle, The Heart of the Systems Development Process, The Traditional Waterfall SDLC, Approaches for Improving Development, CASE Tools, Rapid Application Development, Service-Oriented Architecture, Agile Methodologies, eXtreme Programming, Object- Oriented Analysis and Design

b. The Origins of Software

Introduction, System Acquisition, Reuse

c. Managing the Information Systems Project

Introduction, Managing Information Systems Project, Representing and Scheduling Project Plans, Using Project Management Software

Unit 2 Planning — 7 Hrs.

a. System Development Projects: Identification and Selection

Introduction, Identifying and Selecting Systems Development Projects, Corporate and Information Systems Planning

b. System Development Projects: Initiation and Planning

Introduction, Initiating and Planning Systems Development Projects, Process of Initiating and Planning IS Development Projects, Assessing Project Feasibility, Building and Reviewing the Baseline Project Plan

Unit 3 Analysis — 13 Hrs.

a. System Requirements

Introduction, Performing Requirements Determination, Traditional Methods for Determining Requirements, Contemporary Methods for Determining System Requirements, Radical Methods for Determining System Requirements,

Requirements Management Tools, Requirements Determination Using Agile Methodologies

b. System Process Requirements

Introduction, Process Modeling, Data Flow Diagramming Mechanics, Using Data Flow Diagramming in the Analysis Process, Modeling Logic with Decision Tables

c. System Data Requirements

Introduction, Conceptual Data Modeling, Gathering Information for Conceptual Data Modeling, Introduction to E-R Modeling, Conceptual Data Modeling and the E-R Model, Representing Super-types and Sub-types, Business Rules, Role of Packaged Conceptual Data Models – Database Patterns

Unit 4 Design **12 Hrs.**

a. Designing Databases

Introduction, Database Design, Relational Database Model, Normalization, Transforming E-R Diagrams into Relations, Merging Relations, Physical File and Database Design, Designing Fields, Designing Physical Tables

b. Designing Forms and Reports

Introduction, Designing Forms and Reports, Formatting Forms and Reports, Assessing Usability

c. Designing Interfaces and Dialogues

Introduction, Designing Interfaces and Dialogues, Interaction Methods and Devices, Designing Interfaces and Dialogues in Graphical Environments

Unit 5 Implementation and Maintenance **4 Hrs.**

a. System Implementation

Introduction, System Implementation, Software Application Testing, Installation, Documenting the System, Training and Supporting Users, Organizational Issues in Systems Implementation

b. System Maintenance

Introduction, Maintaining Information Systems, Conducting Systems Maintenance

Teaching Methods

The general teaching pedagogy includes class lectures, group discussions, case studies, guest lectures, research work, project work, assignments (theoretical and practical), and examinations (written and verbal), depending upon the nature of the topics. The teaching faculty will determine the choice of teaching pedagogy as per the need of the topics.

Evaluation

Examination Scheme				
Internal Assessment		External Assessment		Total
Theory	Practical	Theory	Practical	
40	-	60 (3 Hrs.)	-	100

Text Book

1. Jeffrey A. Hoffer, Joey George, Joe Valacich, "*Modern Systems Analysis and Design*", 6/E, Prentice Hall India.

Reference Book

2. Jeffery Whitten, Lonnie Bentley, "*Systems Analysis and Design Methods*", 7/E, McGraw-Hill

Course Title: **Object Oriented Programming in Java (3 Cr.)**
Course Code: **CACS204**
Year/Semester: **II/III**
Class Load: **6 Hrs. / Week (Theory: 3 Hrs, Tutorial: 1, Practical: 2 Hrs.)**

Course Description

This course covers preliminary concepts of object-oriented approach in programming with basic skills using Java. Control structures, Classes, methods and argument passing and iteration; graphical user interface basics Programming and documentation style.

Course Objectives

The general objectives of this course are to provide fundamental concepts of Object Oriented Programming and make students familiar with Java environment and its applications.

Course Contents

Unit 1 Introduction to Java — 2 Hrs.

Definition, History of Java, The Internet and Java's Place in IT, Applications and Applets, Java Virtual Machine, Byte Code- not an Executable code, Procedure-Oriented vs. Object-Oriented Programming, Compiling and Running a Simple Program, Setting up your Computer for Java Environment, Writing a Program, Compiling, Interpreting and Running the Program, Handling Common Errors

Unit 2 Tokens, Expressions and Control Structures — 5 Hrs.

Primitive Data Types: Integers, Floating-Point types, Characters, Booleans; User-Defined Data Types, Declarations, Constants, Identifiers, Literals, Type Conversion and Casting, Variables: Variable Definition and Assignment, Default Variable Initializations; Command-Line Arguments, Arrays of Primitive Data Types, Comment Syntax, Garbage Collection, Expressions, Using Operators: Arithmetic, Bitwise, Relational, Logical, Assignment, Conditional, Shift, Ternary, Auto-increment and Auto-decrement; Using Control Statements(Branching: if, switch; Looping: while, do-while, for; Jumping statements: break, continue and return)

Unit 3 Object Oriented Programming Concepts — 9 Hrs.

Fundamentals of Classes: A Simple Class, Creating Class Instances, Adding methods to a class, Calling Functions/Methods; Abstraction, Encapsulation, Using 'this' keyword, Constructors, Default constructors, Parameterized constructors, More on methods: Passing by Value, by Reference, Access Control, Methods that Return Values, Polymorphism and Method Overloading, Recursion; Nested and Inner Classes.

Unit 4 Inheritance & Packaging **3 Hrs.**

Inheritance: Using 'extends' keyword, Subclasses and Superclasses, 'super' keyword usage, Overriding Methods, Dynamic Method Dispatch; The Object class, Abstract and Final Classes, Packages: Defining a Package, Importing a Package: Access Control; Interfaces: Defining an Interface, Implementing and applying interfaces.

Unit 5 Handling Error/Exceptions **2 Hrs.**

Basic Exceptions, Proper use of exceptions, User defined Exceptions, Catching Exception: try, catch; Throwing and re-throwing: throw, throws; Cleaning up using the finally clause.

Unit 6 Handling Strings **2 Hrs.**

Creation, Concatenation and Conversion of a String, Changing Case, Character Extraction, String Comparison, Searching Strings, Modifying Strings, String Buffer.

Unit 7 Threads **3 Hrs.**

Create/Instantiate/Start New Threads: Extending java.lang.Thread, Implementing java.lang.Runnable Interface; Understand Thread Execution, Thread Priorities, Synchronization, Inter-Thread Communication, Deadlock

Unit 8 I/O and Streams **2 Hrs.**

java.io package, Files and directories, Streams: Byte Streams and Character Streams; Reading/Writing Console Input/Output, Reading and Writing files, The Serialization Interface, Serialization & Deserialization.

Unit 9 Understanding Core Packages **3 Hrs.**

Using java.lang Package: java.lang.Math, Wrapper classes and associated methods (Number, Double, Float; Integer, Byte; Short, Long; Character, Boolean); Using java.util package: Core classes (Vector, Stack, Dictionary, Hashtable, Enumerations, Random Number Generation).

Unit 10 Holding Collection of Data **3 Hrs.**

Arrays And Collection Classes/Interfaces, Map/List/Set Implementations: Map Interface, List Interface, Set Interface, Collection Classes: Array List, Linked List, Hash Set and Tree Set; Accessing Collections/Use of An Iterator, Comparator.

Unit 11 Java Applications **8 Hrs.**

About AWT & Swing, About JFrame (a top level window in Swing), Swing components (JLabel, About text component like JTextField, JButton, Event Handling in Swing Applications, Layout Management using Flow Layout, Border Layout, Grid Layout, Using JPanel, Choice components like JCheck Box, JRadio

Button, Borders components, JCombo Box & its events, JList & its events with MVC patterns, Key & Mouse Event Handling, Menus in swing, JText Area, Dialog boxes in swing, JTable for Displaying Data in Tabular form, MDI using JDesktop Pane & JInternal Frame, Using IDE like Netbeans, JBuilder for building java applications using Drag & Drop), Adapter classes

Unit 12Introduction to Java Applets **1 Hr.**

Definition, Applet lifecycle methods, Build a simple applet, Using Applet Viewer, Adding Controls: Animation Concepts.

Unit 13Database Programming using JDBC **2 Hrs.**

Using Connection, Statement & Result Set Interfaces for Manipulating Data with the Databases

Laboratory Works

Laboratory works should be done covering all the topics listed above and a small project work should be carried out using the concept learnt in this course. Project should be assigned on Individual Basis.

Teaching Methods

The general teaching pedagogy includes class lectures, group discussions, case studies, guest lectures, research work, project work, assignments (theoretical and practical), and examinations (written and verbal), depending upon the nature of the topics. The teaching faculty will determine the choice of teaching pedagogy as per the need of the topics.

Evaluation

Examination Scheme				
Internal Assessment		External Assessment		Total
Theory	Practical	Theory	Practical	
20	20 (3 Hrs.)	60 (3 hrs.)	-	100

Text Books

1. Deitel & Dietel, "*Java: How to program*", 9th Edition, Pearson Education, 2011, ISBN: 9780273759768
2. Herbert Schildt, "*Java: The Complete Reference*", Seventh Edition, McGraw-Hill 2006, ISBN: 0072263857

Reference Books

1. Bruce Eckel, "*Thinking in Java*", 4th Edition, Prentice Hall, 2006, ISBN: 0-13-187248-6
2. Cay Horstmann and Grazy Cornell, "*Core Java Volume I-Fundamentals*", Ninth Edition, Prentice Hall, 2012, ISBN: 978-0137081899
3. E. Balagurusamy, "*Programming with Java: A Primer*", 4th Edition, Tata McGraw Hill Publication, India,

Course Title: **Web Technology (3 Cr.)**
Course Code: **CACS205**
Year/Semester: **II/III**
Class Load: **6 Hrs. / Week (Theory: 3 Hrs, Practical: 3 Hrs.)**

Course Description

This course covers different aspect of web technology such as HTML, CSS, issues of web technology, client tier, server tier and advanced server side issue.

Course Objectives

The general objectives of this course are to provide fundamental concepts of Internet, Web Technology and Web Programming.

Course Contents

Unit 1 HTML and CSS **15 Hrs.**

HTML Basic: HTML Tag Reference, Global Attributes, Document, Structure Tags, Formatting Tags, Text Level Formatting, Block Level Formatting, List Tags, Hyperlink Tags, Executable Content Tags.

Image & Imagemaps: Introduction, Client-Side Imagemaps, Server-Side Imagemaps, Using Server-Side and Client-Side Imagempas Together, Alternative Text for Imagemaps.

Tables: Introduction To HTML Tables and Their Structure, The Table Tags, Alignment, Aligning Entire Table, Alignment within a Row, Alignment within a Cell, Attributes, Content Summary, Background Color, Adding a Caption, Setting the Width, Adding a Border, Spacing Within a Cell, Spacing between the Cells, Spanning Multiple Rows or Columns, Elements that can be Placed in a Table, Table Sections and Column Properties, Tables as a Design Tool.

Frames: Introduction to Frames, Applications, Frames document, The <FRAMESET> tag, Nesting <FRAMESET> tag, Placing content in frames with the <FRAME>Tag, Targeting named Frames, Creating Floating Frames, Using Hidden Frames.

Forms: Creating Forms, The <FORM> tag, Named Input fields, The <INPUT> tag, Multiple lines text windows, Drop Down and List Boxes, Hidden, Text, Text Area, Password, File Upload, Button, Submit, Reset, Radio, Checkbox, Select, Option, Forms and Scripting, Action Buttons, Labeling input files, Grouping related fields, Disabled and read-only fields, Form field event handlers, Passing form data.

Style Sheets: Definition, Importance, Different Approaches to Style Sheets, Using Multiple Approaches, Linking to Style Information in Separate File, Setting up Style Information, Using the <LINK>Tag, Embedded Style Information, Using <STYLE>Tag, Inline Style Information.

Unit 2 Issue of Web Technology **3 Hrs.**

Architectural Issues of Web Layer, Tier Technology: 2-Tier, 3-Tier and n-Tier.

Unit 3 The Client Tier **10 Hrs.**

Representing Content; Introduction to XML; Elements and Attributes; Rules for Writing XML; Namespaces; Schema: Simple Types and Complex Types, XSD Attributes, Default and Fixed Values, Facets, Use of Patterns, Order Indicators(All, Choice, Sequences), Occurrence Indicators (Maxoccurs, Minoccurs), DTD: Internal Declaration, Private External Declaration, Public External Declaration, Defining Elements and Attributes; XSL/XSLT; Xpath; Xquery; SAX; DOM , Creating XML Parser.

Unit 4 The Server Tier **8 Hrs.**

Web Server Concept, Creating Dynamic Content, Using Control Flow to Control Dynamic Content Generation, Sessions and State, Error Handling, Architecting Web Application, Using Tag Libraries, Writing Tag Libraries.

Unit 5 Introduction to Advanced Server Side Issues **9 Hrs.**

Database Connectivity; Creating an SQL statement: Select, Insert, Update, and Delete; Authentication: Anonymous Access, Authentication by IP address and Domain, Integrated Windows Authentication; Cookies; File Handling; Form Handling

Laboratory Works

Laboratory works should be done covering all the topics listed above and a small project work should be carried out using the concept learnt in this course. Project should be assigned on individual basis.

Teaching Methods

The general teaching pedagogy includes class lectures, group works, case studies, guest lectures, research work, project work, assignments (theoretical and practical), tutorials and examinations (written and verbal). The teaching faculty will determine the choice of teaching pedagogy as per the need of the topics.

Evaluation

Examination Scheme				
Internal Assessment		External Assessment		Total
Theory	Practical	Theory	Practical	
20	-	60 (3 Hrs.)	20 (3 Hrs.)	100

Text Books

1. Harvey M. Deitel, Paul J. Deitel & Abbey Deitel, "*Internet and World Wide Web: How to Program*", 5th Edition, Pearson Education, 2012, ISBN: 9780273764021
2. Thomas A. Powell, "*HTML & CSS: The Complete Reference*", McGraw Hill, Fifth Edition, 2010, ISBN: 978-0-07-174170-5

Reference Books

1. Matt J. Crouch, "*ASP.NET and VB.NET Web Programming*", Pearson Education Asia, 2002
2. Rahul Banerjee, "*Internetworking Technologies*", Prentice-Hall of India Limited, Fourth Edition, 2000
3. Thomas A. Powell, "*Web Design: The Complete Reference*", Tata McGraw Hill, Second Edition, 2002

Course Title: **Operating System (3 Cr.)**
Course Code: **CACS251**
Year/Semester: **II/IV**
Class Load: **6 Hrs. / Week (Theory: 3 Hrs, Tutorial: 1, Practical: 2 Hrs.)**

Course Description

This course includes the topics that help students understand operating system and it's functionality along with its types.

Course Objectives

The general objectives of this subject are to provide the basic feature, function and interface with the hardware and application software to run the computer smoothly.

Course Contents

Unit 1 Introduction to Operating System **2 Hrs.**

History, Introduction and Generation of Operating System, Objectives (Resource Manager and Extended Machine), Types of Operating system, Function of Operating system.

Unit 2 Operating System Structure **2 Hrs.**

Introduction, Layered System, Kernel, Types of Kernel (Monolithic/Macro Kernel and Micro / Exo-Kernel), Client-Server Model, Virtual Machines, Shell.

Unit 3 Process Management **15 Hrs.**

Process Concepts(3 Hrs.): Definitions of Process, The Process Model, Process States, Process State Transition, The Process Control Block, Operations on Processes (Creation, Termination, Hierarchies, Implementation), Cooperating Processes, System Calls (Process Management, File management, Directory Management).

Threads (1 Hr): Definitions of Threads, Types of Thread Process (Single and Multithreaded Process), Benefits of Multithread, Multithreading Models (Many-to-One Model, One-to-One Model, Many-to Many Model).

Inter-Process Communication and Synchronization(6 Hrs.): Introduction, Race Condition, Critical Regions, Avoiding Critical Region: Mutual Exclusion And Serializability; Mutual Exclusion Conditions, Proposals for Achieving Mutual Exclusion: Disabling Interrupts, Lock Variable, Strict Alteration (Peterson's Solution), The TSL Instruction, Sleep and Wakeup, Types of Mutual Exclusion (Semaphore, Monitors, Mutexes, Message Passing, Bounded Buffer), Serializability: Locking Protocols and Time Stamp Protocols; Classical IPC Problems (Dining Philosophers Problems, The Readers and Writers Problem, The Sleeping Barber's Problem)

Process Scheduling(5 Hrs): Basic Concept, Type of Scheduling (Preemptive Scheduling, Nonpreemptive Scheduling, Batch, Interactive, Real Time Scheduling), Scheduling Criteria or Performance Analysis, Scheduling Algorithm (Round-Robin, First Come First Served, Shortest-Job- First, Shortest Process Next, Shortest Remaining Time Next, Real Time, Priority Fair Share, Guaranteed, Lottery Scheduling, HRN, Multiple Queue, Multilevel Feedback Queue); Some Numerical Examples on Scheduling.

Unit 4 Deadlocks **4 Hrs.**

System Model, System Resources: Preemptable and Non-Preemptable; Conditions for Resource Deadlocks, Deadlock Modeling, The OSTRICH Algorithm, Method of Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance: Banker's Algorithm, Deadlock Detection: Resource Allocation Graph, Recovery from Deadlock.

Unit 5 Memory Management **7 Hrs.**

Basic Memory Management (3 Hrs.): Introduction, Memory Hierarchy, Logical Versus Physical Address Space, Memory Management with Swapping: Memory Management with Bitmaps and with Linked List; Memory Management without Swapping, Contiguous-Memory Allocation: Memory Protection, Memory Allocation, Fragmentation (Inter Fragmentation and External Fragmentation); Non-Contiguous Memory Allocation, Fixed Partitioning Vs. Variable Partitioning, Relocation and Protection, Coalescing and Compaction.

Virtual Memory (4 Hours): Background, Paging, Structure of Page Table: Hierarchical Page Table, Hashed Page Table, Inverted Page Table, Shared Page Table; Block Mapping Vs. Direct Mapping, Demand Paging, Page Replacement and Page Faults, Page Replacement Algorithms: FIFO,OPR,LRU, SCP; Some Numerical Examples on Page Replacement, Thrashing, Segmentation, Segmentation With Paging.

Unit6 Input/ Output Device Management **4 Hrs.**

Principle of I/O Hardware: I/O Devices, Device Controllers, Memory Mapped I/O, Direct Memory Access; Principle of I/O Software: Goals of I/O Software, Program I/O, Interrupt -Driven I/O, I/O Using DMA; I/O Software Layers: Interrupts Handler, Device Drivers, Device Independent I/O Software, User - Space I/O Software; Disk: Disk Hardware; Disk Scheduling: Seek Time, Rational Delay, Transfer Time; Disk Scheduling Algorithms: FCFS Scheduling, SSTF Scheduling, SCAN Scheduling, C-SCAN Scheduling, Lock Scheduling

Unit 7 File System Interface Management **2 Hrs.**

File Concept: File Naming, File Structure, File Type, File Access, File Attributes, File Operation and File Descriptors; Directories: Single-Level Directory Systems, Hierarchical Directory Systems, Path Names, Directory Operation; Access

Methods: Sequential, Direct; Protection: Types of Access, Access Control List, Access Control Matrix

Unit 8 Security Management **3 Hrs.**

Introduction, Security Problems, User Authentication: Passwords, password Vulnerabilities, Encrypted password, One Time Password and Biometrics password; User Authorization, Program Threats: Trojan Horse, Trap Door, Stack and Buffer Overflow; System Threats: Worms, Viruses, Denial of Services.

Unit 9 Distributed Operating System **4 Hrs.**

Introduction, Advantages of Distributed System over Centralized System, Advantages of Distributed System over Independent PCs, Disadvantages of Distributed System, Hardware and Software Concepts, Communication in Distributed Systems, Message Passing, Remote Procedure Call, Process in Distribution System, Clock Synchronization.

Unit 10 Case Study **2 Hrs.**

DOS and Windows Operating System, Unix Operating System, Linux Operating System

Laboratory Works

Lab works should be done covering all the topics listed above and a small project work should be carried out using the concept learnt in this course. Project should be assigned on Individual Basis.

Teaching Methods

The general teaching pedagogy includes class lectures, group discussions, case studies, guest lectures, research work, project work, assignments (theoretical and practical), and examinations (written and verbal), depending upon the nature of the topics. The teaching faculty will determine the choice of teaching pedagogy as per the need of the topics.

Evaluation

Examination Scheme				
Internal Assessment		External Assessment		Total
Theory	Practical	Theory	Practical	
20	20 (3 Hrs.)	60 (3 Hrs.)	-	100

Text Books

1. Andrew S. Tanenbaum, "*Modern Operating System* 6/e", PHI, 2011/12
2. Silberschatz, P.B. Galvin, G. Gagne, "*Operating System Concepts 8/e* ", Wiley India, 2014 ISBN : 9788126520510

Reference Books

1. Andrew S. Tanenbaum, "*Distributed Operating System*", Pearson
2. D M Dhamdhere, "*System Programming and Operating System*", Tata McGraw-Hill, 2009
3. P. Pal Choudhury, "*Operating Systems Principles and Design*", PHI, 2011

Course Title: **Numerical Methods (3 Cr.)**
Course Code: **CACS252**
Year/Semester: **II/IV**
Class Load: **6 Hrs. / Week (Theory: 3 Hrs, Tutorial: 1, Practical: 2 Hrs.)**

Course Description

This course covers solution of nonlinear equations, interpolation and approximation, numerical differentiation and integration and solution of linear algebraic equation, ordinary differential equations and partial differential equations. It provides knowledge for numerical analysis.

Course Objectives

The general objectives of this subject are to make students familiar with the theory of numerical analysis for solving algebraic and transcendental equations, solution of ordinary and partial differential equations, numerical differentiation and integration.

Course Contents

Unit 1 Solution of Nonlinear Equations **10 Hrs.**

Introduction, Types of Equation, Errors in Computing, The Bisection Method; The Method of False Position, Newton- Raphson Method, Solution of System of Nonlinear Equation, Fixed Point Iteration and Convergence

Unit 2 Interpolation and Approximation **8 Hrs.**

Introduction, Errors in Polynomial Interpolation, Lagrange's Polynomials, Newton's Interpolation using Difference and Divided Differences, Cubic Spline Interpolation, Least Squares Method for Linear and Non-linear Data.

Unit 3 Numerical Differentiation and Integration **5 Hrs.**

Introduction to Numerical Differentiation, Newton's Differentiation Formulas, Numerical Integration (Trapezoidal Rule, Simpson's 1/3 rule, 3/8 rule); Romberg Integration; Numerical Double Integration.

Unit 4 Solution of Linear Algebraic Equations **10 Hrs.**

Review of the existence of solutions and properties of matrices, Consistency of a Linear System of Equations, Gaussian Elimination Method, Gauss-Jordan Method, Inverse of matrix using Gauss Elimination Method, Method of factorization, Iterative Methods(Jacobi & Gauss-Seidel Iteration),Power Method.

Unit 5 Solution of Ordinary Differential Equations **7 Hrs.**

Introduction to Differential Equations, Initial Value Problem, Taylor Series Method, Picard's Method, Euler's Method and Its Accuracy, Heun's method,

Runge-Kutta Methods, Solution of Higher Order Equations, Boundary Value Problems, Shooting Method and Its Algorithm.

Unit 6 Solution of Partial Differential Equations **5 Hrs.**

Introduction to Partial Differential Equations, Deriving Difference Equations, Laplacian Equation and Poisson's Equation.

Laboratory Works

Laboratory works will consist of program development and testing of Non-linear Equations, Interpolation, Numerical Differentiation and Integration, Linear Algebraic Equations, Ordinary and Partial Differential Equations using C or C++Builder.

Teaching Methods

The general teaching pedagogy includes class lectures, group discussions, case studies, guest lectures, research work, project work, assignments (theoretical and practical), and examinations (written and verbal), depending upon the nature of the topics. The teaching faculty will determine the choice of teaching pedagogy as per the need of the topics.

Evaluation

Examination Scheme				
Internal Assessment		External Assessment		Total
Theory	Practical	Theory	Practical	
20	20 (3 Hrs.)	60 (3 Hrs.)	-	100

Text Books

1. C.F. Gerald and P.O. Wheatley, "*Applied Numerical Analysis*", 4th Edition, Addison Wesley Publishing Company, New York
2. S. S Sastry, "*Introduction to Methods of Numerical Analysis*",- Prentice- Hall India

Reference Books

1. W. Chency and D. Kinciad, "*Numerical Mathematics and Computing*", 2nd edition, Brooks/Cole Publishing Co., 1985
2. W.H. Press, B.P. Flannery et. al., "*Numerical Recipes in C*", 1st Edition, Cambridge Press, 1998.

3. S. Yakwitz and F. Szidarovszky, "*An Introduction to Numerical Computations*", 2nd Edition, Macmillan Publishing Co., New York.
4. S.S. Sastry, "*Engineering Mathematics Volume two*", Prentice-Hall of India.

Course Title: **Software Engineering (3 Cr.)**
Course Code: **CACS253**
Year/Semester: **II/IV**
Class Load: **4 Hrs. / Week (Theory: 3 Hrs, Tutorial: 1)**

Course Description

This course includes the topics that provide fundamental concept and standard of software engineering so that students will be able to develop software and/or handle software project using the global standard of software.

Course Objectives

This Course is designed to provide the students with the basic competencies required to identify requirements, documents the system design and maintain a developed system. It presumes a general understanding of computers and programming which are covered in the first and second semester of the degree.

Course Contents

Unit 1 Introduction **4 Hrs.**

Definition of Software, Type of Software, Characteristic of Software, Attributes of Good Software, Definition of Software Engineering, Software Engineering Costs, Key Challenges that Software Engineering Facing, System Engineering and Software Engineering, Professional Practice.

Unit 2 Software Development Process Model **8 Hrs.**

Software Process, Software Process Model: The Waterfall Model, Evolutionary Development, Component-Based Software Engineering (CBSE); Process Iteration: Incremental Delivery, Spiral Development; Rapid Software Development: Agile Methods, Extreme Programming, Rapid Application Development, Software Prototyping; Rational Unified Process (RUP), Computer Aided Software Engineering (CASE): Overview of CASE Approach, Classification of CASE tools.

Unit 3 Software Requirement Analysis and Specification **10 Hrs.**

System and Software Requirements, Type of Software Requirements: Functional and Non-Functional Requirements, Domain Requirements, User Requirements; Elicitation and Analysis of Requirements: Overview of Techniques, View Points, Interviewing, Scenarios, Use-Case, Ethnography, Requirement Validation, Requirement Specification, Feasibility.

Unit 4 Software Design **10 hrs.**

Design Concept: Abstraction, Architecture, Patterns, Modularity: Cohesion, Coupling; Information Hiding, Functional Independence, Refinement; Architectural Design: Repository Model, Client Server Model, Layered Model, Modular Decomposition; Procedural Design Using Structured Methods, User

Interface Design: Human-Computer Interaction, Information Presentation, Interface Evaluation; Design Notation.

Unit 5 Coding **2 Hrs.**

Programming Language and Development Tools, Selecting Languages and Tools, Good Programming Practices

Unit 6 Software Testing and Quality Assurance **6 Hrs.**

Verification and Validation, Techniques of Testing: Black-box and White-box Testing, Inspections; Level of Testing: Unit Testing, Integration Testing, Interface Testing, System Testing, Alpha and Beta Testing, Regression Testing; Design of Test Cases, Quality Management Activities, Product and Process Quality, Standards: ISO9000, Capability Maturity Model (CMM);

Unit 7 Software Maintenance **3 Hrs.**

Evolving Nature of Software, Different Types of Maintenance: Fault Repair, Software Adaptation, Functionality Addition or Modification; Maintenance Prediction, Re-Engineering, Configuration Management (CM): Importance of CM, Configuration Items, Versioning;

Unit 8 Managing Software Projects **2 Hrs.**

Needs for the Proper Management of Software Projects, Management Activities: Project Planning, Estimating Costs, Project Scheduling, Risk Management, Managing People;

Teaching Methods

The general teaching pedagogy includes class lectures, group discussions, case studies, guest lectures, research work, project work, assignments (theoretical and practical), and examinations (written and verbal), depending upon the nature of the topics. The teaching faculty will determine the choice of teaching pedagogy as per the need of the topics.

Evaluation

Examination Scheme				
Internal Assessment		External Assessment		Total
Theory	Practical	Theory	Practical	
40	-	60 (3 Hrs.)	-	100