

Goa University

CBCS (B.A./B.Sc/B.Com) Syllabus for the discipline **Computer Science** Core, Discipline Specific Elective, Generic Elective and Skill Enhancement Elective Courses is listed as follows :

1. [Computer Science : Discipline Specific Core \(DSC\) Courses](#)
2. [Computer Science : Discipline Specific Elective \(DSE\) Courses](#)
3. [Computer Science : Generic Elective \(GE\) Courses](#)
4. [Computer Science : Skill Enhancement \(SEC\) Courses](#)

B.Sc. Computer Science (General / Honours)

1. [The structure of B.Sc. Computer Science \(General / Honours\)](#)

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The **Generic Electives (GE)** courses offered under CBCS in the [Computer Science discipline](#) are listed below.

❖ The General Electives for BA, B.Sc. and B.Com can be chosen from the following list.

Course Code	Title of paper	Credits(T+P)
CSG101	Computer Fundamentals and Emerging Technologies	3+1
CSG102	Cyber Space & Cyber Security	3+1
CSG103	IT Fundamentals	3+1
CSG104	Multimedia and Web Design	3+1
CSG105	Computer Applications – I	3+1
CSG106	Computer Applications – II	3+1
CSG107	Computer Systems - Desktop Publishing	3+1
CSG108	Multimedia Technology	3+1
CSG109	Open Source Technology	3+1
CSG110	Client Side Web Development	3+1

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Programme : BA/B.Sc./B.Com.

[Computer Science :: Generic Elective](#)

Course Code : CSG101 Title of course : Computer Fundamentals and Emerging Technologies

Number of credits : 3T +1P Effective from : 2017-18

Objectives: To provide an understanding of Fundamental Technology Concepts and Emerging Technologies in Computer Field. Includes practical skills in data capture, text editing with report formatting, effective presentation tools, efficient search techniques and online collaboration tools.

Content :

Unit I Lectures:15, Practical Lab:1 Sessions Marks(Theory-30, Practicals-1)

Computer Fundamentals (Theory)

Introduction: Introduction to computer system, uses, types.

Data Representation: Number system and Coding Schemes(ASCII and UNICODE).

Human Computer Interface: Relationship between Hardware and Software, Types of software, Operating system as user interface, utility programs.

Role of Computers in: Business, Manufacturing, Mobile Computing, Public Sector, Media, Defense Services.

Lab 1: Computer Fundamentals (Practical)

- a. Features of MS Windows based OS and any of the Linux flavor, Setting up users and User rights in a computer, Adding a printer, Software Installation
- b. Troubleshooting basic computer connections.

Unit II Lectures: 15, Practical Lab: 10 Sessions Marks (Theory-10,

Practicals-18) Content/Data Management Tools (Theory) User Generated

Content: Blogs and Wikis.

Online Data Capture Tools: Types of data capture form templates (Personal, Work and Education). Question Formats for data capture (short answer, paragraph, multiple choice, check- box, drop-down, linear-scale, multiple choice grid). Data form design (Add new question, add section, add title/description/image/video). Data form distribution techniques (Send via email, publish on social media, send as link). Response management (Print responses, Export to spreadsheet, View analysis, Include analysis in word processing reports) Text Formatting using Word Processing tools: Use of Templates, Working with document: Editing text, Find and replace text, Formatting, spell check, Autocorrect, Autotext; Bullets and numbering, Tabs, Paragraph Formatting, Indent, Page Formatting, Header and footer, section break, footnotes, bibliography and references. Tables: Inserting, filling and formatting a table; Inserting Pictures and Video; Managing Mail Merge: including linking with Database; Printing documents Creating Business Documents using the above facilities.

Data Presentation using Presentation tools: Slides, Fonts, Drawing, Editing; Inserting: Tables, Images, texts, Symbols, Media; Design; Transition; Animation; and Slide-show. Creating Business Presentations using above facilities

Lab 2.1 : Creating Content for the Web (Practicals)

- a. Create a blog using popular blogging tools like WordPress/ BlogSpot.

- b. Edit Wikipedia articles.

Lab 2.2 : Data Capture using Google Forms (Practicals)

- a. Create data forms to capture data for Event Registration, Event Feedback, Customer feedback/satisfaction on a product or service and Order Request.

Lab 2.3 : Report Formatting using Word Processing (Practicals)

- a. Draft an official letter for job interview invitation/ job appointment/ invitation to an event, use mail merge to input the recipients list linking with database.
- b. Given a project report in PDF format transfer to word processor software and format to include title page, specified Paragraph and Page Formatting (page size, orientation, line spacing, font type and font size, Indent, bullets, paragraph formatting) details, Acknowledgement page, Table of contents page, List of figures page, List of Tables page, bibliography, references, distinct headers for each chapter, page numbering in roman for initial pages and normal from first chapter. The document should be checked for spelling errors and corrected appropriately.
- c. Design a certificate in landscape orientation with a border around the document.
- d. Design a Garage Sale sign.

Lab 2.4 : Content Presentation using Presentation Software (Practicals)

- a. Preparing presentation in areas such as Impact of Social Media on Youth, Emerging trends in Mobile Technology include appropriate slide animation, slide transitions, sound recording, slide timings, customer feedback video.
- b. Export the presentation as video or save as slide show.
- c. Prepare handouts for audience.

Unit III Lectures: 5, Practical Lab: 3 Sessions

Marks(Theory -20, Practical -5)

Overview of Emerging Technologies

Cloud Computing: Meaning, Features, & Service models – Infrastructure as a service, Advantages and disadvantages, Mobile Computing: Meaning, Business Applications of Mobile computing, Virtual reality & Augmented Reality : Meaning and applications , IOT - Internet of Things: Meaning & Application

Lab 3: Web Applications (Practicals)

- a. Scheduling tasks in Google Calendar
- b. Create/Upload documents / spreadsheets and presentations online.
- c. Share and Collaborate in real time
- d. Safely store and organize your work of Google Drive or OneDrive

Unit IV Lectures: 10, Practical Lab: 1 Sessions

Marks (Theory-15, Practical -1)

Computing Trends in Internet, Education and Research:

Internet-role and importance, Web Server and Web clients like web browser or web app, IP addressing : Public Vs Private, Static Vs Dynamic, world wide web and related protocols, e-Library, Google Scholar.

Lab 4: Internet Applications (Practical)

- a. Surfing the Internet, Using Email and Search Engines
- b. Advanced web search and translation services, Web search, image search, Search only for pages that contain (ALL the search terms contain the exact phrase you type,

contain at least one of the words you type, do NOT contain any of the words you type, written in a certain language, created in a certain file format like ppt, pdf, rtf, doc, xls)

- c. Advanced search operators: Include search (“+” search), synonym search, OR search, Domain search, Numrange search, other advanced search features (Google, Local language, Technology Search, Date, Occurrences, Domains, Safe search),

Text Book / Reference Books:

1. Introduction to Information Technology by ITL Education Solutions Limited, second edition.
2. ‘ O’ Level made simple “introduction to ICT resources” by Satish Jain, Shashank Jain, Shashi Singh & M. Geetha Iyer, BPB publication.
3. Computer Fundamentals fourth edition by Pradeep K. Sinha and Priti Sinha BPB publications
4. Information Technology The breaking wave by Dennis Curtin Tata McGraw-hill edition
5. Computer Fundamentals by A. Goel, Pearson Education, 2010.
6. Introduction to Information Technology by P. Aksoy and L. DeNardis, Cengage Learning, 2006

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Programme : B.A./B.Sc./B.Com.

[Computer Science :: Generic Elective](#)

Course Code : CSG102 Title of course : Cyber Space and Cyber Security

Credits : 3T+1P Effective from : 2017-18

Objectives: To introduce computer networking, e-commerce and understand principles of cyber security, online threats and cyber laws and prepare students to adopt safe practices.

Content :

Unit I Lectures: 6, Practical Lab: 2 Sessions Marks (Theory -15, Practicals -2)

Basics of Computer Networking

Networking basics, Need for computer networks, Types of networks-LAN, MAN, WAN, Network Components – H/W, Software, Communication channels, Network Devices, Network topologies.

Lab1

- *Basic Networking Setup of PC, Network commands like ipconfig, ping, traceroute, nslookup / dig etc, Setup of Home Router / Wifi Hotspot,*
- *Understanding of Firewall and Basic Firewall Setup, File and Printer Sharing, connecting to share*
- *Setup of Email Clients like Outlook, FTP Clients and Upload / Download.*
- *Finding out public address, connection speeds etc.*

Unit II Lectures: 10, Practical Lab: 04 Sessions Marks (Theory-15, Practicals-16) E-Commerce

Definition, Hardware requirements, E-commerce and Trade Cycle, Electronic Markets, Electronic Data Interchange and Internet Commerce, Benefits and Risk, Types of E-commerce :Business to Business E-Commerce, Business to Consumer E-Commerce. Consumer to Consumer, Electronic

Payment Systems: Smart Cards – Credit Cards – Wallets, Risks, E-Retail, Concept and Examples, E-Banking, Features and services , M-Commerce, Products and services

Lab 2

E-commerce

- *Attempt to purchase a product online from any E-Commerce Site. Proceed till payment gateway. Check digital certificates (such as ebay.in and amazon.com)*
- *Write a review of an E-Commerce Site visited include: Site description, Site Design, ease in navigation , process for purchasing items, security, privacy, compare with competitors, customer service, best features of site etc.*
- *An E-commerce site case study: Include Target market/audience: who uses this service?*

Revenue model: where does the money come from? Competitive environment: who else is competing in this market, or who might enter the market and threaten this company's position? Competitive advantage analysis: how is your case company attempting to gain an advantage: competing on cost? Differentiation? How are they

promoting their products in the marketplace? ,How have they been doing - financial results if available?

Unit III Lectures: 15, Practical Lab: 02 Sessions Marks (Theory-25, Practicals-2)

Emerging threats in Cyber Space

Introduction to cyber space, Malware threats- Definition and types(Virus/ worms, Trojan, Rootkits,

Spyware, Keyloggers). Social Engineering, Cyber Crimes – Definition, Types (DOS, Intellectual Property crimes, Unauthorized access to computer system or networks, Theft of information contained in electronic form, Cyber Stalking, Identity Theft, Forgery, E-mail Spoofing, E-mail bombing, Online gambling, Sale of illegal articles, Child pornography, Cyber Defamation, Salami attack, Phishing, Pharming, Data Diddling, Virus/ worm attack, logic bombs, Web jacking, Theft of computer system, physically damaging a computer system, Cyber warfare, Cyber terrorism.)

Lab 3

- *Installation and Configuration of any free Antivirus Package eg. AVG/Avast etc., Using Antivirus Package for Threat Detection*
- *Browser security and Safety such as Understanding SSL and Certificates, checking URL of site for Phishing attempts*
- *Email Headers and Tracking, Identification of Phishing Emails*

Unit IV Lectures: 7, Practical Lab 03 Sessions Marks (Theory-10, Practicals-2)

Online Privacy and Cyber Safety

Online Privacy – Introduction, Significance, Privacy Policy, Sensitive Personal Information, Social media – Usage, Safety. Online shopping – Introduction, Safety measures (Encryption of data authentication , SSL, Digital signatures, Digital Certificates) Online payments – Introduction, Types, Safe practices.

Lab 4

- *Keeping passwords cyber secure-Choosing strong password,*
- *Privacy settings on Facebook, Social Media Safety*
- *Payment Systems Security concerns and Safe Practices*
- *Online Banking Security features, OpenPGP Tools.*

Unit V Lectures: 7, Practical Lab 04 Sessions Marks (Theory-10, Practicals-3)

Cyber Laws and Cyber Forensics

Cyber Laws: Evolution and Need for cyber law, the legal perspectives – Indian perspective, Global perspective, Information Technology Act(ITA) 2000, Provisions related to E-commerce, Provisions for cyber-crimes, Information Technology (Amendment)(ITAA) Act 2008, Adjudicating officer, CERT-IN- its role and powers.

Reporting Cyber Crimes, Cyber Forensics: Introduction, Evidence collection, Data Recovery, Cloning of Devices, Forensic Investigation phases – Acquisition and preservation, Authentication, Analysis, Documenting Evidence, Presentation of Evidence, Media sanitization.

Lab 5

- *Use of Investigation tools such as Winhex for forensic investigation.*
- *Data Recovery using winhex*

- *Use of Free data recovery tools like Recuva*
- *Mapping a given list of cyber-crimes to appropriate ITAA Act 2008 offence listed in http://www.naavi.org/ita_2008/index*

Text Book / Reference Books

1. Rick Lehtinen and G. T. Gangemi, Computer Security Basics, O'Reilly Media, Inc.; 2nd Edition, 2006
2. Wall, David, (2007). Cyber Crime: The Transformation of Crime in the Information Age. Polity Publishing
3. Michael cross, Scene of the Cyber Crime, Syngress Publishing, Elsevier Publishing, 2nd Edition, ISBN 13: 978-1-59749-276-8
4. Chander, Harish, Cyber Laws and IT Protection, ISBN: 978-81-203-4570-6
5. Nina Godbole, Sunit Belapure, "Cyber Security – Understanding Cyber Crimes, Computer Forensics and Legal Perspectives", Wiley India Pvt.Ltd., ISBN - 978-81-265-2179-1
6. Frontiers of Electronic Commerce Ravi Kalakota & Andrew B Whinston, Pearson Education.
7. Cyber Laws, <http://deity.gov.in/content/cyber-laws>
8. www.cert.org
9. Frontiers of Electronic Commerce Ravi Kalakota & Andrew B Whinston, Pearson Education.

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Programme : B.A./B.Sc./B.Com.

[Computer Science :: Generic Elective](#)

Course Code : CSG105

Title of course : Computer Applications -I

Number of Credits: 3T+1P

Effective from : 2017-18

Objectives: To provide an understanding of essential Information Technology Concepts and Emerging Technologies. Includes practical skills in data capture, analysis and presentation, report formatting, efficient search techniques and online collaboration tools.

Content :

Unit I Lectures: 15, Practical Lab 02 Marks Th-30, Pr-1.

Information Technology Basics

Information : Prerequisites of Information, Need for Information Technology and its advantages; Information Technology : Definition and components; Data : Definition, Types, Data Representation, Number system and Coding Schemes(ASCII and UNICODE); Parts of a Computer: CPU, Memory, Input/ Output Devices, Auxiliary Memory; Software – Definition, Relationship between Hardware and Software, Categories of Software, OS - definition & functions Role of Information Technology in : Business, Mobile Computing, Health Services, ,Public Sector, Media, Defence Services, Education and Publication. **Lab1**

OS basic

Installation of Operating System (Demonstration only) , Demonstrate features of any MS Windows based OS or any of the Linux flavor , Identification of Directories , Setting up computer, Add a printer, Check device drivers, Installation software, Users and administrative rights for installation , Unicode, Enable computer to support regional language, add Keyboard, Use onscreen keyboard, install phonetic keyboard, type the national anthem using Unicode, Use online translators and transliteration services

Unit II Lectures: 10, Practical Lab 06 Marks Th-10, Pr-10.

Introduction to Data Handling, Processing and Analysis

Word processing concepts: Use of Templates, Working with word document: Editing text, Find and replace text, Formatting, spell check, Autocorrect, Autotext, Bullets and numbering, Tabs, Paragraph Formatting, Indent, Page Formatting, Header and footer, Tables: Inserting, filling and formatting a table; Inserting Pictures and Video; Mail Merge: including linking with Database; Printing documents Creating Business Documents using the above facilities

Spreadsheet concepts: Managing worksheets; Formatting, Entering data, Editing, and Printing a worksheet; Handling operators in formula, Project involving multiple spreadsheets, Organizing Charts and graphs, Generally used Spreadsheet functions: Mathematical, Statistical, Financial, Logical, Date and Time, Lookup and reference, Database, and Text functions

Lab 2.1 Data capture using Google Forms

Create data forms to capture data for Event Registration, Event Feedback, Customer feedback/satisfaction on a product or service and Order Request.

Lab2.2 Report formatting using Word Processing

Draft an official letter for job interview invitation/ job appointment/ invitation to an business trade show event, use mail merge to input the recipients list linking with database.

Given a project report in PDF format transfer to word processor software and format to include title page, specified Paragraph and Page Formatting (page size, orientation, line spacing, font type and font size, Indent, bullets, paragraph formatting) details, Acknowledgement page, Table of contents page, List of figures page, List of Tables page, bibliography, references, distinct headers for each chapter, page numbering in roman for initial pages and normal from first chapter. The document should be checked for spelling errors and corrected appropriately. Create/ Upload a document in a collaboration software like Google docs. Share and collaborate in real time, Safely store and organize your work, Control who can see your documents

Lab2.3 Spreadsheet

Working with worksheets -Entering data, Formatting, Editing, and Printing a worksheet, Formulas and Functions, Handling operators in formula, Generally used Spreadsheet functions - Mathematical, Statistical, Financial, Logical, Date and Time, Lookup and reference, Database, and Text functions, Inserting Charts and graphs, Data Sorting and Filtering

Introduction to some more useful functions such as the IF, nested IF, VLOOKUP and HLOOKUP, construction of Pivot Tables to organize data, Creating spreadsheet in the area of: Loan and Lease statement; Ratio Analysis; Payroll statements; Capital Budgeting; Depreciation Accounting; Graphical representation of data; Frequency distribution and its statistical parameters; Correlation and Regression

Unit III Lectures: 05, Practical Lab 02 Marks Th-05, Pr-06.

Presentation Software

Basics of presentations: Slides, Fonts, Drawing, Editing; Inserting: Tables, Images, texts, Symbols, Media; Design; Transition; Animation; and Slideshow. Creating Business Presentations using above facilities

Lab 3 Data Presentation using Presentation Software

Preparing presentation in areas such as Customer satisfaction/ feedback, product analysis, job satisfaction using the data obtained through data capture tool, including appropriate slide animation, sound recording, slide timings, customer feedback video. Export the presentation as video or save as slide show. Prepare handouts for audience. Working with multimedia tools: Image manipulation - Use any image editing tool such as (GIMP, Inkspace) to design the cover page of Book; Audio manipulation - Use any two Mp3 tracks of your choice to create a unique two minute composition that is significantly different from either of the original tracks; Video manipulation - Make a Movie on a given topic with the help Windows Movie Maker.

Unit IV Lectures: 15, Practical Lab 5 Marks Th-30, Pr-8.

Internet Applications and Emerging Technologies

Internet – role and importance, Web Browser, IP Addressing – Public Vs Private, Static Vs Dynamic; WWW & related protocols; Internet Applications.

Cloud Computing: Meaning, Features, & Service models – Infrastructure as a service, Advantages and disadvantages, Mobile Computing: Meaning, Business Applications of Mobile computing, Virtual reality & Augmented Reality: Meaning and applications, IOT - Internet of Things: Meaning & Application

Lab 4 Surfing the Internet, Use of Email and Search Engines

Advanced web search and translation services, Web search, image search, Search only for pages that contain (ALL the search terms contain the exact phrase you type, contain at least one of the words you type, do NOT contain any of the words you type, written in a certain language, created in a certain file format like ppt, pdf, rtf, doc, xls), Advanced search operators: Include search (“+” search), synonym search, OR search, Domain search, Numrange search, other advanced search features (Google, Local language, Technology Search, Date, Occurrences, Domains, Safe search), Multiuser ; Google docs: Create documents, spreadsheets and presentations online, Share and collaborate in real time, Safely store and organize your work, Control who can see your documents

Text Books / Reference Books:

- 1. Introduction to Information Technology by ITL Education Solutions Limited, second edition.*
- 2. ‘O’ Level made simple “Introduction to ICT resources” by Satish Jain, Shashank Jain, Shashi Singh & M. Geetha Iyer, BPB publication.*
- 3. Computer fundamentals fourth edition by Pradeep K. Sinha and Priti Sinha BPB publications 4. Information Technology The breaking wave by Dennis Curtin Tata McGraw-hill edition*
- 5. Cloud Computing by Anandamurugan, T.Priyaa et al.*
- 6. Internet of Things: A Hands-On Approach byArsheep Bahga*

Web references

- 1. www.moodle.org,*
- 2. www.wikipedia.org*

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Programme : B.A./B.Sc./B.Com.

[Computer Science :: Generic Elective](#)

Course Code : CSG106

Title of course : Computer Applications - II

Number of Credits: 3T+1P

Effective From : 2017-18

Objectives: To understand computer networking concepts, e-commerce technology and business applications; understand principles of cyber security, online threats and cyber laws and prepare students to adopt safe practices.

Content :

Unit I Lectures: 6, Practical Lab 02 Marks Th-15, Pr-2.

Basics of Computer Networking

Networking basics, Need for computer networks, Types of networks-LAN, MAN, WAN, Network Components – H/W, Software, Communication channels, Network Devices, Network topologies.

Lab1

Basic Networking Setup of PC, Network commands like ipconfig, ping, traceroute, nslookup / dig, etc, Setup of Home Router / Wifi Hotspot, Understanding of Firewall and Basic Firewall Setup, File and Printer Sharing, connecting to share, Setup of Email Clients like Outlook, FTP Clients and Upload / Download. Finding out public address, connection speeds etc.

Unit II Lectures: 10, Practical Lab 07 Marks Th-15, Pr-15.

E-Commerce

Definition, E-commerce and Trade Cycle, Electronic Markets, Electronic Data Interchange and Internet

Commerce, Types of E-commerce :Business to Business E-Commerce, Business to Consumer E-Commerce.

Consumer to Consumer, Electronic Payment Systems: Smart Cards –Credit Cards – Wallets, Risks, ERetail, Concept and Examples, E-Banking, Features and services, M-Commerce, Products and services

Lab2

E-commerce

- *Attempt to purchase a product online from any E-Commerce Site. Proceed till payment gateway. Check digital certificates (such as ebay.in and amazon.com)*

- Write a review of an E-Commerce Site visited include: Site description, Site Design, ease in navigation , process for purchasing items, security, privacy, customer service, best features of site etc..
- An E-commerce site case study: Include Target market/audience: who uses this service? Revenue model: where does the money come from? How are they promoting their products in the marketplace? ,

Unit III Lectures: 15, Practical Lab 02 Marks Th-25, Pr-2.

Emerging threats in Cyber Space

Introduction to cyber space, Malware threats- Definition and types (Virus/ worms, Trojan, Rootkits, Spyware, Keyloggers). Social Engineering, Cyber Crimes – Definition, Types (DOS, Intellectual Property Rights and related crimes, Unauthorized access to computer system or networks, Theft of information contained in electronic form, Cyber Stalking, Identity Theft, Email Spoofing, E-mail bombing, Online gambling, Sale of illegal articles, Cyber Defamation, Salami attack, Phishing, Pharming, Data Diddling, logic bombs, Web jacking, Theft of computer system, physically damaging a computer system, Cyber warfare, Cyber terrorism.)

Lab3

Installation and Configuration of any free Antivirus Package eg. AVG/Avast etc., Using Antivirus Package for Threat Detection, Browser security and Safety such as Understanding SSL and Certificates, checking URL of site for Phishing attempts, Email Headers and Tracking, Identification of Phishing Emails

Unit IV Lectures: 14, Practical Lab 04 Marks Th-20, Pr-6.

Cyber Safety, IT Act and Cyber forensic

Online Privacy – Introduction, Significance, Privacy Policy, Sensitive Personal Information, Social media – Usage, Safety. Online shopping – Introduction, Safety measures (Encryption of data authentication , SSL, Digital signatures, Digital Certificates), Online payments – Introduction, Types, Safe practices.

Cyber Laws: Evolution and Need for cyber law, The legal perspectives – Indian perspective, Global perspective, Information Technology Act(ITA) 2000, Provisions related to E-commerce, Provisions for cyber-crimes, Information Technology (Amendment)(ITAA) Act 2008, Adjudicating officer, CERT-IN- its role and powers. Reporting Cyber Crimes, Cyber Forensics: Introduction, Evidence collection, Data Recovery, Cloning of Devices, Forensic Investigation phases – Acquisition and preservation, Authentication, Analysis, Documenting Evidence, Presentation of Evidence, Media sanitization.

Lab4.1

Keeping passwords cyber secure-Choosing strong passwords, Privacy settings on Facebook, Social Media Safety, Payment Systems Security concerns and Safe Practices, Online Banking Security features, OpenPGP Tools.

Lab4.2

Use of Investigation tools such as Winhex for forensic investigation, Data Recovery using winhex, Use of Free data recovery tools like Recuva, Mapping a given list of cyber-crimes to appropriate ITAA Act 2008 offence listed in http://www.naavi.org/ita_2008/index

Text Books / Reference Books :

1. Rick Lehtinen and G. T. Gangemi, *Computer Security Basics*, O'Reilly Media, Inc.; 2nd Edition, 2006
2. Wall, David, (2007). *Cyber Crime: The Transformation of Crime in the Information Age*. Polity Publishing
3. Michael cross, *Scene of the Cyber Crime*, Syngress Publishing, Elsevier Publishing, 2nd Edition, ISBN 13: 978-1-59749-276-8
4. Chander, Harish, *Cyber Laws and IT Protection*, ISBN: 978-81-203-4570-6
5. Nina Godbole, SunitBelapure, "Cyber Security – Understanding Cyber Crimes, Computer Forensics and Legal Perspectives", Wiley India Pvt.Ltd., ISBN - 978-81-265-2179-1
6. *Frontiers of Electronic Commerce* Ravi Kalakota & Andrew B Whinston, Pearson Education.
7. Bruce Schneier, "Applied Cryptography-Protocols, Algorithms and Source code in C", 2nd Edition, Wiley India Pvt Ltd, ISBN 978-81-265-1368-0
8. *Cyber Laws*, <http://deity.gov.in/content/cyber-laws>
9. www.cert.org

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Programme : B.A./B.Sc./B.Com.

Computer Science :: Generic Elective

Course code : CSG108

Title of course : Multimedia Technology

Number of Credits : 3T+1P

Effective from : 2018-19

Pre-requisites: Basic working knowledge of Computers and Internet.		
Objectives: To make the students aware of <ul style="list-style-type: none">▪ Color Models and color harmony,▪ Raster and Vector Graphics formats & basic Graphic editing,▪ Font types, selection of fonts▪ Audio formats, codecs, basic audio editing, filters▪ Video formats, codecs, basic video editing, filters and transitions ▪ Data compression.		
Content :		
(Theory)		
1.	Introduction to Multimedia, Social & Ethical considerations, Digital Representations Standards	3L
2.	Color Theory - Color Basics, Color Systems, Color Wheel, Complementary Colors, After Images, Color Combinations, Color & Contrast, Itten's Contrasts, Proportion & Intensity, Contrast & Dominance, Shades & Tints, Color Studies; Color Gamut, ICC profiles, Gamma Correction.	7 L
3.	Introduction to Computer Graphics: Difference between Raster and Vector Graphics, Raster graphics : resolution, image compression, file formats, manipulation, Geometrical transformations; Vector graphics – fundamentals, file formats, shapes, transforms and filters	8 L
4.	Text and Layout: character set, fonts, layout & Text in graphics	6 L
5.	Sound: Sound Design, Audio Codec & file formats, processing sound, compression	10 L
6.	Animation: Types of Animation, Keyframe, Sprite , Perception of vision, Human Color Perception	4 L
7.	Video: Aspect Ratio, Frame Size, Frame Rate, Regions, Video Codec & Formats, Processing, Delivery	7 L

Text Books / Reference Books :

1. Nigel Chapman, Jenny Chapman; Digital Multimedia; Wiley India Edition, 2nd Edition
2. Roger Parker; One-Minute Designer; Hungry Minds Inc, U.S.; 2nd edition
3. Ranjan Parekh, "Principles of Multimedia", McGraw Hill Education; 2 edition
4. Tay Vaughan, "Multimedia Making It Work"; Mc Graw Hill, Eighth Edition

(Practical)

30 Hours

Suggested of Practical

(at least 8 Practical from the following)

1. Image compositing : Remove background and combine images to create a work of art
2. Learn to create images for Print, Web and Video
3. Design a Logo for a company
4. Design a Brochure for given Product and details. Learn about different file formats
5. Design a poster with given information and learn about image compression
6. Edit the sound file and Learn about Effects and Filters of sound.
7. Record your voice and learn about Audio Compression
8. Learn Audio mixing and streaming of audio content
9. Learn about Video editing – Prepare video with rough cut.
10. Prepare video content with title and special effects.
11. Record video content and learn about video compressions.
12. Prepare Video content for vimeo / youtube.

Note : Practical can be done using GIMP, Inkscape, Scribus, Blender, Audacity, Lightworks / Kdenlive

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List of **Skill Enhancement Courses (SEC)** offered under CBCS in the Computer Science discipline are listed below.

Skill Based Papers (SEC) offered in Computer Science :

Course Code	Title of paper	Credits(T+P)
CSS101	Computer Applications for Business- I	2+2
CSS102	Computer Applications for Business- II	2+2
CSS103	Programming in Python	3+1
CSS104	Web Application Development using Flask	3+1
CSS105	Web Application Development using ASP.NET	3+1
CSS106	Web Application Development using Django	3+1
CSS107	Agile Software Development	3+1
CSS108	Network Administration	3+1
CSS109	PHP Programming	3+1

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Programme : B.A./B.Sc./B.Com.

[Computer Science :: SEC](#)

Course Code: CSS101

Title of course : Computer Applications for Business - I

Number of credits : 2T+2P

Effective from : 2018-19

Marks: 100(Theory 50 + Practical 50)

Lectures: 30, Practical Lab: 30 Sessions

One Theory Lecture = One Hour & One Practical Lab Session = Two Hours

Objectives: To enhance the students' understanding of usefulness of information technology tools for business operations and to familiarize them with the processes needed to develop, report, and analyze business data that involves use of spreadsheet and spreadsheet add-ins to solve business problems.

Theory:

Unit I: Concepts of Data Processing and analysis Lectures: 8, Marks Th-15

- a. Data Processing – Steps involved in data processing, advantages of computers in data processing , file management concepts- standard methods of organizing data, file management system, file types: transaction & master, file organization techniques – sequential, direct, indexed sequential
- b. Data analysis and forecasting - importance of data analysis in business, Data forecasting – its need , benefits of data forecasting , use of forecast formula, statistical and financial functions.
- c. Data Integration: concept and how it works

Unit II: Creating Business Spreadsheets

Lectures: 6, Marks Th-10

- a. Spreadsheet concepts, Managing worksheets; Formatting, Entering data, Editing, and Printing a worksheet;
Handling operators in formula, Project involving multiple spreadsheets, Organizing Charts and graphs
- b. Generally used Spreadsheet functions: Mathematical, Statistical, Financial, Logical, Date and Time,
Lookup and reference, Database, and Text functions
- c. Creating spreadsheet in the area of: Loan and Lease statement; Ratio Analysis; Payroll statements; Capital Budgeting; Depreciation Accounting; Graphical representation of data; Frequency distribution and its statistical parameters; Correlation and Regression
- d. Meaning and Advantages of macros

Unit III: Overview of Business Analytics

Lectures: 6, Marks Th-10

- a. Introduction to Analytics: Business analytics – meaning and basic concepts
- b. Visualization/ Data Issues: Organization/sources of data, Importance of data quality , Dealing with missing or incomplete data , Data Classification
- c. Introduction to Data Mining: Meaning, basic concepts, data mining process

Unit IV: Internet technology

Lectures: 10, Marks Th-15

- a. Introduction to computer networks : Introduction- need, advantages, disadvantages, types of networks, types of transmission media, networking devices-bridges, routers, gateways, IP addressing: why IP address, basic format of IP address- IPV4, IPV6, Protocols - HTTP, HTTPS, FTP, DNS, Email
- b. Applications on Internet: search engines ,browsers, blogs, social networking - types and applications

REFERENCE

1. Computer Fundamentals by Pradeep K. Sinha and Priti Sinha
2. Introduction to Information Technology – ITL Education Solutions Limited, Pearson Education
3. Web technology- Kahate
4. Excel manual
5. Davenport article - “Competing on Analytics” , LaValle et al. article - “Analytics: The New Path to Value”
6. Davenport and Harris article - “The Dark Side of Customer Analytics”
7. [www.howstuffworks .com](http://www.howstuffworks.com)

Note:

1. There shall be a theory examination of 50 Marks (Internal Assessment – 10 Marks; End Semester Exam – 40 Marks) of 1^{1/2} hrs duration
2. There shall be two lectures per theory class.

PRACTICALS:

1. Advanced Spreadsheet

Pr Lab 20 Mks Pr-30

(MS-Excel or any similar open source software)

- a. Result representation of data using spreadsheet
- b. What-if analysis, Logical tests(nested if functions), Goal seek,
- c. Representing results graphically
- d. Filtering, advanced filters, sorting and conditional formatting data

- e. Data validation techniques, Hyperlinks
- f. Pivot table, Scenarios
- g. Summing through the sheets
- h. Getting external data files into Excel
- i. Macros - creation, editing and deletion of macros

Assignments to be given on the following topics: to prepare and analyse Loan and Lease statement; Ratio Analysis; Payroll statements; Capital Budgeting; Depreciation Accounting; Graphical representation of data; Frequency distribution and its statistical parameters; Correlation and Regression

2. Business Analytics Pr Lab 3 Mks Pr-5.

(Using Spreadsheet or Statistical Package such as Gretel/SPSS)

- a. Assignments to analyse data available from IndiaStat.com such as Analysis of demographic data, environment data, public expenditure
- b. Analyse data from annual reports of Companies and banks

3. Designing, building and Launching a website

Pr Lab 7 Mks Pr-15.

Static Web Page Development, Basics of HTML: Create a Web page, Linking to other Web Pages, Publishing HTML Pages, Text Alignment and Lists, Text Formatting Fonts Control, Email Links and link within a Page, Creating a Table, Creating HTML Forms, Creating Web Page Graphics, Putting Graphics on a Web Page, Custom Backgrounds and Colors, Creating Simple Animated Graphics.

Note:

1. There shall be a practical examination of 50 Marks at the end of each semester (Practical-40 Marks and Work Book- 10 Marks) and duration of Examination shall be 2 Hrs.
2. There shall be 2 Practical Lab sessions per batch to be taught in computer Lab.

Goa University

Programme : B.A./B.Sc./B.Com.

[Computer Science :: SEC](#)

Course Code: CSS102

Title of course : Computer Applications for Business - II

Number of credits : 2T+2P

Effective from : 2018-19

Marks: 100(Theory 50 + Practical 50)

Lectures: 30, Practical Lab: 30 Sessions

One Theory Lecture = One Hour & One Practical Lab Session = Two Hours

Objectives: To familiarise the student with various applications of Information and Communication technologies in business and to familiarize with the mechanism for conducting business transactions through electronic means.

Content :

Theory

Unit I: Ecommerce theory

Lectures: 8, Marks Th-15

- a. Introduction to E-Commerce: Scope, Definitions, Trade Cycles
- b. The Value Chain / Supply Chain, Porter's Value Chain
- c. Electronic data Interchange (EDI): Introduction, definition and benefits, technology standards, Communication, implementation, agreements, EDI and business.
- d. E-Commerce models- categorizing major E-commerce business models(B2B,B2C,C2C), introduction , key elements a business model
- e. E-payment System: Models and methods of e-payments (Debit Card, Credit Card, Smart Cards, e-money), digital signatures (procedure, working), payment gateways, risks involved in e-payments.
- f. E-Commerce applications in various industries: banking, insurance, payment of utility bills, online marketing, e-tailing (popularity, benefits, problems and features), online services (financial, travel and career), auctions, online learning, publishing and entertainment, Online shopping (amazon, snapdeal, alibaba, flipkart, etc.)

Unit II: Database Management System

Lectures: 10, Marks Th-15

- a. Database Designs for Accounting and Business Applications: Reality- Expressing the Application; Creating Initial design in Entity Relationship(ER) Model; Transforming ER Model to Relational data model concepts; Implementing RDM design using an appropriate DBMS.
- b. SQL and Retrieval of Information: Basic Queries in SQL; Embedded Queries in SQL; Insert, Delete and Update statements in SQL
- c. DBMS Software: Environment; Tables; Forms; Queries; Reports; Modules;
- d. Applying DBMS in the areas of Accounting, Inventory, HRM and its accounting, Managing the data records of Employees, Suppliers and Customers.

Unit III: ERP

Lectures: 6, Marks Th-10

- a. Introduction: Traditional information model, Introduction to an enterprise, What is an ERP?, Reasons for growth of ERP market, Advantages and Disadvantages of ERP
- b. Introduction to business modules: finance, manufacturing, Human resource, materials management, sales and distribution, Limitations of ERP,
- c. ERP and e-Commerce

Unit IV: Security and Encryption

Lectures: 6, Marks Th-10

- a. Need and concepts, the e-commerce security environment- dimension, definition and scope of e- security
- b. Security threats in the E-commerce environment - security intrusions and breaches, attacking methods like hacking, sniffing, cyber-vandalism etc.
- c. Technology solutions- Encryption security channels of communication, protecting networks and protecting servers and clients

Note:

1. There shall be a theory examination of 50 Marks (Internal Assessment – 10 Marks; End Semester Exam – 40 Marks) of 1^{1/2} hrs duration
2. There shall be two lectures per theory class.

REFERENCE

1. E-Commerce: Strategy, Technologies and Applications By David Whitely, Tata McGraw Hill Edition. I
2. Kalakota and Whinston, Frontiers of Electronic commerce, Pearson Education Asia.
3. S Sadagopan, “ERP a Management Prospective” Tata McGraw Hill Publishing Company Limited, New Delhi 1999
4. Database systems – Bipin Desai
5. MS-Access manual
6. Alexis Leon , “ERP Demystified”, Tata McGraw Hill Publishing Company Limited, New Delhi 2000
7. Kenneth C. Laudon and Carlo Guercio Traver, *E-Commerce*, Pearson Education
8. Bharat Bhaskar, *Electronic Commerce: Framework, Technology and Application, 4th Ed.*, McGraw Hill Education
9. PT Joseph, *E-Commerce: An Indian Perspective*, PHI Learning
10. KK Bajaj and Debjani Nag, *Ecommerce*, McGraw Hill Education
11. TN Chhabra, *E-Commerce*, Dhanpat Rai & Co.
12. Sushila Madan, *E-Commerce*, Taxmann
13. TN Chhabra, Hem Chand Jain, and Aruna Jain, *An Introduction to HTML*, Dhanpat Rai & Co .

(Practical)

1. Database Management System

Pr Lab 25 Mks Pr-35

(MS-Access or any similar open source software)

- Creating Database and Tables, Changing Table Contents, Adding and Editing Records, Changing Table Properties, Creating Relationships between Tables, Importing and Exporting Data with other Programs.
- Creating Queries: Using the Query Window, Using Criteria and Saving Queries, Criteria Expressions and Operators,
Changing a Query and Totaling, Creating a Query to the above-made Databases
- Creating Forms: Putting List Box on the Form, Selecting and Redesigning Labels and Data, Moving Label and Data, Adding Data and using Data Validation
- Creating Reports: Creating a single Column Report, Creating a Grouped Data Report, Adding Graphs to Reports.
- Use of Macros for search and navigation filters.

2. Mini-Project in ERP Implementation

Pr Lab 5 Mks Pr-15

Case study – Studying ERP implementation in any business firm

Report preparation and submission – report shall include ERP introduction, life cycle as followed by the Business firm under study – pre-evaluation screening, package evaluation, project planning phase, gap analysis, reengineering, configuration, implementation team training, testing, going live, end user training, post implementation.

Note:

1. There shall be a practical examination of 50 Marks at the end of each semester (Practical-30 Marks and Work Book- 10 Marks) and duration of Examination shall be 2 Hrs.