**GANDHI INSTITUTE OF TECHNOLOGY AND MANAGEMENT (GITAM)**

(Deemed to be University)

VISAKHAPATNAM * HYDERABAD * BENGALURU

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

## GITAM School of Science

# CURRICULUM AND SYLLABUS

## 3 Year Undergraduate Programme
## UCSCI01: Bachelor of Computer Applications

w.e.f. 2023-24 admitted batch

(Updated on 31st July 2023)

# Academic Regulations

**Applicable for the Undergraduate Programme in the Schools of Technology, Humanities & Social Sciences, Business and Sciences**

**https://www.gitam.edu/academic-regulations**

# VISION AND MISSION OF THE UNIVERSITY

## VISION

To become a global leader in higher education.

## MISSION

To impart futuristic and comprehensive education of global standards with a high sense of discipline and social relevance in a serene and invigorating environment.

## Bachelor of Computer Applications

# VISION AND MISSION OF THE SCHOOL

## VISION

To nurture outstanding science education and to build a vibrant, world class research & innovation ecosystem.

## MISSION

I. To provide a flexible and adaptive curriculum that emphasizes experiential learning to allow students to realize their full potential.

II. Develop high impact research knowledge and solutions to improve communities in which we live.

III. To promote a culture of healthy curiosity, enterprising mindset, and keen desire to contribute to society.

IV. To inculcate empathy, integrity, trust with a strong commitment towards society and environment among the GITAM fraternity.

# Bachelor of Computer Applications

**(w.e.f. academic year 2023-24 batch)**

## PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

| | |
|---|---|
| **PEO 1** | Graduate shall have successful professional career in data science and allied fields with In depth knowledge and practical/interpersonal skills. |
| **PEO 2** | Graduates will have the ability to apply knowledge across the disciplines like computer science, optimization, and statistics to handle the realistic problems |
| **PEO 3** | Graduates will demonstrate skill in Data management and will demonstrate proficiency in statistical analysis of data. |

**Mapping of the Mission of the School with the PEOs**

| | **PEO1** | **PEO2** | **PEO3** |
|---|---|---|---|
| **M1** | H | H | H |
| **M2** | H | H | H |
| **M3** | L | L | L |
| **M4** | M | M | M |

## PROGRAMME OUTCOMES (POs)
## &
## PROGRAMME SPECIFIC OUTCOMES (PSOs)

### PROGRAMMEOUTCOMES(POs) AND PROGRAMME SPECIFIC OUTCOMES(PSOs):

At the end of the Programme the students would be able to:

| | |
|---|---|
| **PO1** | Critical Thinking: Take informed actions after identifying the assumptions that frame our thinking and actions, checking out the degree to which these assumptions are accurate and valid, and looking at our ideas and decisions (intellectual, organizational, and personal) from different perspectives. |
| **PO2** | Effective Communication: Speak, read, write and listen clearly in person and through electronic media in English and in one Indian language, and make meaning of the world by connecting people, ideas, books, media and technology. |
| **PO3** | Social Interaction: Elicit views of others, mediate disagreements and help reach conclusions in group settings. |
| **PO4** | Effective Citizenship: Demonstrate empathetic social concern and equity centred national development, and the ability to act with an informed awareness of issues and participate in civic life through volunteering. |
| **PO5** | Ethics: Recognize different value systems including your own, understand the moral dimensions of your decisions, and accept responsibility for them. |
| **PO6** | Environment and Sustainability: Understand the issues of environmental contexts and sustainable development. |
| **PO7** | Self-directed and Life-long Learning: Acquire the ability to engage in independent and life-long learning in the broadest context of socio-technological changes. |
| **PSO1** | Software Development Skills: Familiarity and practical competence with a broad range of programming languages. Apply standard software engineering practices and strategies in software project development. |
| **PSO2** | Mathematical Skills: An ability to apply mathematical methodologies to solve computation task, model real world problem using appropriate data structure and suitable algorithm. |
| **PSO3** | Knowledge of Computing Systems: Equip the graduates to potentially rich and employable in the field of Computer applications along with aspirations for higher studies. |
| **PSO4** | Lifelong Learning: Prepare graduates who will be lifelong learners through continuous Professional development |

**Curriculum Structure**

*(Choice Based Credit System)*

| UNIVERSITY CORE (UC) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Course code** | **Level** | **Course title** | **L** | **T** | **P** | **S** | **J** | **C** |
| CSEN1001 | 1 | IT Productivity Tools^ | 0 | 0 | 2 | 0 | 0 | 1* |
| CLAD1001 | 1 | Emotional Intelligence & Reasoning Skills (Soft Skills 1) | 0 | 0 | 2 | 0 | 0 | 1 |
| CLAD1011 | 1 | Leadership Skills & Quantitative Aptitude (Soft Skills 2) | 0 | 0 | 2 | 0 | 0 | 1 |
| CLAD1021 | 1 | Verbal Ability & Quantitative Ability (Soft Skills 3) | 0 | 0 | 2 | 0 | 0 | 1 |
| CLAD1031 | 1 | Practicing Verbal Ability & Quantitative Aptitude (Soft Skills 4) | 0 | 0 | 2 | 0 | 0 | 1 |
| CLAD20XX | 2 | Soft skills 5A/5B/5C | 0 | 0 | 2 | 0 | 0 | 1 |
| CLAD20XX | 2 | Soft skills 6A/6B/6C | 0 | 0 | 2 | 0 | 0 | 1 |
| DOSP10XX | 1 | Sports 1# | 0 | 0 | 0 | 2 | 0 | 2* |
| DOSL10XX | 1 | Club Activity# | 0 | 0 | 0 | 2 | 0 | 2* |
| DOSL10XX | 1 | Community Service# | 0 | 0 | 0 | 0 | 2 | 2* |
| ENVS1001 | 1 | Environmental Studies^ | 3 | 0 | 0 | 0 | 0 | 3* |
| FINA3001 | 3 | Personal Financial Planning# | 0 | 0 | 2 | 0 | 0 | 1* |
| LANG1012 | 1 | Communication Skills in English - Intermediate | 0 | 0 | 4 | 0 | 0 | 2 |
| LANG1022 | 1 | Communication Skills in English - Advanced | 0 | 0 | 4 | 0 | 0 | 2 |
| MFST1001 | 1 | Health and Wellbeing# | 0 | 0 | 2 | 0 | 0 | 1* |
| POLS1001 | 1 | Indian Constitution and History | 2 | 0 | 0 | 0 | 0 | 2* |
| PHPY1001 | 1 | Gandhi for the 21st Century | 2 | 0 | 0 | 0 | 0 | 2* |
| VEDC1001 | 1 | Venture Development | 0 | 0 | 0 | 2 | 0 | 2 |

* Pass/Fail courses
# Opt any two courses among the five
^ Online/Swayam/NPTEL Courses

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

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| CLAD2031 | 2 | Preparation for Campus Placement-2 (Soft skills 6A) | 0 | 0 | 2 | 0 | 0 | 1 |
| CLAD2041 | 2 | Preparation for Higher Education (GRE/ GMAT)-2 (Soft skills 6B) | 0 | 0 | 2 | 0 | 0 | 1 |
| CLAD2051 | 2 | Preparation for CAT/ MAT - 2 (Soft skills 6C) | 0 | 0 | 2 | 0 | 0 | 1 |

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

| **Club Activity Courses** | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Course code** | **Level** | **Course title** | **L** | **T** | **P** | **S** | **J** | **C** |
| DOSL1001 | 1 | Club Activity (Participant) | 0 | 0 | 0 | 2 | 0 | 2 |
| DOSL1011 | 1 | Club Activity (Member of the Club) | 0 | 0 | 0 | 2 | 0 | 2 |
| DOSL1021 | 1 | Club Activity (Leader of the Club) | 0 | 0 | 0 | 2 | 0 | 2 |
| DOSL1031 | 1 | Club Activity (Competitor) | 0 | 0 | 0 | 2 | 0 | 2 |
| | | | | | | | | |
| **Community Service courses** | | | | | | | | |
| **Course code** | **Level** | **Course title** | **L** | **T** | **P** | **S** | **J** | **C** |
| DOSL1041 | 1 | Community Services - Volunteer | 0 | 0 | 0 | 0 | 2 | 2 |
| DOSL1051 | 1 | Community Services - Mobilizer | 0 | 0 | 0 | 0 | 2 | 2 |

| FACULTY CORE (FC) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Course code** | **Level** | **Course title** | **L** | **T** | **P** | **S** | **J** | **C** |
| MATH1131 | 1 | Mathematics-I | 4 | 0 | 0 | 0 | 0 | 4 |
| MATH1141 | 1 | Mathematics-II | 4 | 0 | 0 | 0 | 0 | 4 |
| MATH1291 | 3 | Elementary Statistics | 4 | 0 | 0 | 0 | 0 | 4 |

| Program Core (PC) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Course code** | **Level** | **Course Title** | **L** | **T** | **P** | **J** | **S** | **C** |
| CSCI1041 | 1 | Python Programming Lab | 0 | 0 | 2 | 0 | 0 | 1 |
| CSCI1051 | 1 | Problem Solving and Programming with Python | 4 | 0 | 0 | 0 | 0 | 4 |
| CSCI1061 | 1 | Introduction to Information technology | 4 | 0 | 0 | 0 | 0 | 4 |
| CSCI1071 | 1 | Data Analysis Lab | 0 | 0 | 2 | 0 | 0 | 1 |
| CSCI1131 | 1 | Fundamentals of Digital Logic Circuits | 4 | 0 | 0 | 0 | 0 | 4 |
| CSCI1081 | 1 | Introduction to Operating Systems | 4 | 0 | 0 | 0 | 0 | 4 |
| CSCI1091 | 1 | Web Technologies | 4 | 0 | 0 | 0 | 0 | 4 |
| CSCI1101 | 1 | Web Technologies Lab | 0 | 0 | 2 | 0 | 0 | 1 |
| CSCI1111 | 1 | Introduction to Object Oriented Programming with C++ | 4 | 0 | 0 | 0 | 0 | 4 |
| CSCI1121 | 1 | Programming with C++ Lab | 0 | 0 | 2 | 0 | 0 | 1 |
| CSCI2001 | 2 | Elementary Data Structures Using C++ | 4 | 0 | 0 | 0 | 0 | 4 |
| CSCI2011 | 2 | Data Structures using C++ Lab | 0 | 0 | 2 | 0 | 0 | 1 |
| CSCI2021 | 2 | Introduction to Unix Programming | 4 | 0 | 0 | 0 | 0 | 4 |
| CSCI2031 | 2 | Unix Programming Lab | 0 | 0 | 2 | 0 | 0 | 1 |
| CSCI2041 | 2 | Principles of Software Engineering | 4 | 0 | 0 | 0 | 0 | 4 |
| CSCI2051 | 2 | Introduction to Data Communication and Networks | 4 | 0 | 0 | 0 | 0 | 4 |
| CSCI2061 | 2 | Introduction to Database Management Systems | 4 | 0 | 0 | 0 | 0 | 4 |
| CSCI2071 | 2 | Database Management Systems Lab | 0 | 0 | 2 | 0 | 0 | 1 |
| CSCI2081 | 2 | Introduction to Java Programming | 4 | 0 | 0 | 0 | 0 | 4 |
| CSCI2091 | 2 | Java Programming Lab | 0 | 0 | 2 | 0 | 0 | 1 |
| CSCI2121 | 2 | Advanced Python Programming Lab | 0 | 0 | 2 | 0 | 0 | 1 |
| CSCI3001 | 3 | Object Oriented Analysis and Design | 4 | 0 | 0 | 0 | 0 | 4 |
| CSCI3041 | 3 | PHP Programming | 4 | 0 | 0 | 0 | 0 | 4 |
| CSCI3051 | 3 | PHP Programming Lab | 0 | 0 | 2 | 0 | 0 | 1 |
| CSCI3061 | 3 | Data Visualization using Tableau Lab | 0 | 0 | 2 | 0 | 0 | 1 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| CSCI3021 | 3 | R Programming Lab | 0 | 0 | 2 | 0 | 0 | 1 |
| CSCI3071 | 3 | Introduction to Cloud Computing | 4 | 0 | 0 | 0 | 0 | 4 |
| CSCI3081 | 3 | Introduction to Block Chain Technologies | 4 | 0 | 0 | 0 | 0 | 4 |
| CSCI3091 | 3 | Project work | 0 | 0 | 12 | 0 | 0 | 12 |

| **Programme Elective (PE)#** | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Course code** | **Level** | **Course Title** | **L** | **T** | **P** | **J** | **S** | **C** |
| CSCI2101 | 2 | Introduction to Cryptography | 4 | 0 | 0 | 0 | 0 | 4 |
| CSCI2111 | 2 | Fundamentals of Artificial Intelligence | 4 | 0 | 0 | 0 | 0 | 4 |
| CSCI3011 | 3 | Introduction to Data Mining | 4 | 0 | 0 | 0 | 0 | 4 |
| CSCI3031 | 3 | Foundations of Data Science | 4 | 0 | 0 | 0 | 0 | 4 |
| # Opt any one course in level 2 from Program Elective Basket<br># opt any one course in level 3 from Program Elective Basket | | | | | | | | |

| **Allocation of credits for 3-year B.C.A. Program** | | |
|---|---|---|
| Type of Course | Credits | % of Program (in credits) |
| University Core | 12 | 10% |
| Faculty Core | 12 | 10% |
| Program Core | 88 | 73.33% |
| Program Electives | 8 | 6.66% |
| Open Electives | 0 | 0 |
| Total | 120 | 100% |

**Course PO Mapping**

| Course Code | Course Name | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PSO 1 | PSO 2 | PSO 3 | PSO 4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MATH1131 | Mathematics – I | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 |
| MATH1141 | Mathematics-II | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 |
| MATH1291 | Elementary Statistics | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 |
| CSCI1041 | Python Programming Lab | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 |
| CSCI1051 | Problem Solving and Programming with Python | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 |
| CSCI1061 | Introduction to Information technology | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 |
| CSCI1071 | Data Analysis Lab | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 |
| CSCI1131 | Fundamentals of Digital Logic Circuits | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 |
| CSCI1081 | Introduction to Operating Systems | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 |
| CSCI1091 | Web Technologies | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 |
| CSCI1101 | Web Technologies Lab | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 |
| CSCI1111 | Introduction to Object | SDG | SDG | SDG | SDG | SDG | SDG | SDG | SDG | SDG | SDG | SDG |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Oriented Programming with C++ | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 |
| CSCI1121 | Programming with C++ Lab | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 |
| CSCI2001 | Elementary Data Structures Using C++ | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 |
| CSCI2011 | Data Structures using C++ Lab | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 |
| CSCI2021 | Introduction to Unix Programming | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 |
| CSCI2031 | Unix Programming Lab | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 |
| CSCI2041 | Principles of Software Engineering | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 |
| CSCI2051 | Introduction to Data Communication and Networks | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 |
| CSCI2061 | Introduction to Database Management Systems | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 |
| CSCI2071 | Database Management Systems Lab | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 |
| CSCI2081 | Introduction to Java Programming | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CSCI2091 | Java Programming Lab | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 |
| CSCI2121 | Advanced Python Programming Lab | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 |
| CSCI2101 | Introduction to Cryptography | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 |
| CSCI2111 | Fundamentals of Artificial Intelligence | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 |
| CSCI3001 | Object Oriented Analysis and Design | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 |
| CSCI3041 | PHP Programming | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 |
| CSCI3051 | PHP Programming Lab | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 |
| CSCI3061 | Data Visualization using Tableau Lab | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 |
| CSCI3021 | R Programming Lab | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 |
| CSCI3071 | Introduction to Cloud Computing | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 |
| CSCI3081 | Introduction to Block Chain | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Technologies | | | | | | | | | | | |
| CSCI3011 | Introduction to Data Mining | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 |
| CSCI3031 | Foundations of Data Science | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 |
| CSCI3091 | Project work | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 | SDG 4 |

# Syllabus

# University Core

| CSEN1001 | IT Productivity Tools | L | T | P | S | J | C |
|---|---|---|---|---|---|---|---|
| | | 0 | 0 | 2 | 0 | 0 | 1* |
| **Pre-requisite** | None | | | | | | |
| **Co-requisite** | None | | | | | | |
| **Preferable exposure** | Familiarity with Computer system and its operation. | | | | | | |

**Course Description:**

*This course introduces all software tools that improve the productivity of a student in enhancing his learning experience with all the activities taken up as part of his coursework.*

**Course Educational Objectives:**

- To enable the learner, the skill in preparing technical documents of professional quality using docs, sheets and forms.
- To involve the student in designing and creating of websites and acquaint the student with the skill of processing audio, images, documents etc.
- To create awareness in analyzing data using pivot tables, query manager etc.
- To create awareness in composing emails, mail merge, e-mail merge etc.
- To provide the exposure to work with collaborative tools.

**List of Experiments:**

1. Create a typical document consisting of text, tables, pictures, multiple columns, with different page orientations.
2. Create a technical paper / technical report consisting of table of contents, table of figures,table of tables, bibliography, index, etc.
3. Compose and send customized mail / e-mail using mail-merge.
4. Create / modify a power point presentation with text, multimedia using templates withanimation.
5. Create spreadsheet with basic calculations with relative reference, absolute reference, andmixed reference methods.
6. Simple report preparation using filtering tool / advanced filtering commands / pivot tables in spreadsheet application.
7. Analyse the results of a examination student wise, teacher wise, course wise, institute-wise.
8. Collecting and consolidating data using collaborative tools like google docs, sheets, forms.
9. Create charts / pictures using online tools like: www.draw.io or smart draw
10. Create a website of his interest.

**Textbooks:**

1. Katherin Murray, 'Microsoft Office 365 Connect and collaborate virtually anywhere, anytime', Microsoft Press, ISBN: 978-0-7356-5694-9
2. EXCEL 2021 The Comprehensive Beginners to Advanced Users Guide to Master Microsoft Excel 2021. Learn the Essential Functions, New Features, Formulas, Tips and Tricks, and Many More
3. https://drawio-app.com/tutorials/video-tutorials/
4. Learning Web Design: A Beginner's Guide to HTML, CSS, JavaScript, and WebGraphics Fourth Edition ISBN-13: 978-1449319274

**References/Online Resources:**

1. https://www.coursera.org/learn/introduction-to-computers-and-office-productivity-software
2. https://www.coursera.org/projects/analyze-data-pivot-tables-crosstabs-google-sheets
3. https://www.coursera.org/learn/excel-advanced#syllabus
4. https://www.coursera.org/learn/how-to-create-a-website
5. https://support.microsoft.com/en-us/office
6. https://www.diagrams.net/
7. https://edu.google.com/

**Course Outcomes:**

1. Create / alter documents / Technical Paper / Project report with text, pictures, graphs ofdifferent styles.
2. Create / modify power point presentations with text, multimedia and to add animationusing / creating templates.
3. Perform basic calculations / retrieve data / createpivot tables / chart using a spreadsheetapplication.
4. Create simple diagrams / charts using online tools like: www.draw.io .
5. Manage documents, presentations, spreadsheets and websites in collaborative mode.

**CO-PO Mapping:**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PS12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | | | | | 2 | | | | 1 | 1 | | | | | |
| CO2 | | | | | 2 | | | | 1 | 1 | | | | | |
| CO3 | 2 | 1 | 1 | | 2 | | | | 1 | 1 | | | | | |
| CO4 | | | | | 2 | | | | 1 | 1 | | | | | |
| CO5 | | | | | 2 | | | | 3 | 3 | | | | | |

Note: 1 - Low Correlation 2 - Medium Correlation 3 - High Correlation

**APPROVED IN:**

**BOS : September 6, 2021**

**ACADEMIC COUNCIL: 21st AC(September 17, 2021**

**SDG No. & Statement: 4** Quality Education

Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all.

**SDG Justification:**

The students can perform simple document preparation to complex calculations in isolated mode and collaborative mode that are useful throughout their career.

| CLAD1001 | EMOTIONAL INTELLIGENCE & REASONING SKILLS (SOFT SKILLS 1) | L | T | P | S | J | C |
|---|---|---|---|---|---|---|---|
| | | 0 | 0 | 2 | 0 | 0 | 1 |
| **Pre-requisite** | None | | | | | | |
| **Co-requisite** | None | | | | | | |
| **Preferable exposure** | None | | | | | | |

**Course Description:**

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

**Course Educational Objectives:**

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

**List of Activities & Tasks for Assessment:**

| Unit | Topics | Hours |
|---|---|---|
| 1 | Self-Awareness & Self-Regulation: Introduction to Emotional Intelligence, *Self-Awareness:* Self-Motivation, Accurate Self-Assessment (SWOT Analysis),Self-Regulation: *Self Control, Trustworthiness & Adaptability* | 3 |
| 2 | Importance, Practising Social Awareness, Building Relationships, Healthy andUnhealthy Relationships, Relationship Management Competencies-Influence, Empathy, Communication, Types of Conflicts, Causes, Conflict Management | 3 |

| | | |
|---|---|---|
| 3 | Social Media: Creating a blog, use of messaging applications, creating awebsite to showcase individual talent, creation of a LinkedIn Profile | 2 |
| 4 | Goal Setting & Time Management: Setting SMART Goals, Time Wasters, Prioritization, Urgent Vs Important, Q2 Organization | 3 |
| 5 | Teamwork: Team Spirit, Difference Between Effective and Ineffective Teams, Characteristics of High Performance Teams, Team Bonding, Persuasion, Team Culture, Building Trust, Emotional Bank Account | 4 |
| 6 | Verbal Reasoning: Introduction, Coding-decoding, Blood relations, Ranking Directions, Group Reasoning | 6 |
| 7 | Analytical Reasoning: Cubes and Dices, Counting of Geometrical figures | 3 |
| 8 | Logical Deduction: Venn diagrams, Syllogisms, Data Sufficiency, Binary logic | 4 |
| 9 | Spatial Reasoning: Shapes, Paper Cutting/Folding, Mirror images, Water images and Rotation of figures | 2 |

**References:**


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


**Course Outcomes:**

1. Students will be able to relate more effectively to themselves, their colleagues and to others
2. Students will be able to set their short term and long term goals and better manage their time
3. Students will be able to manage conflicts in an emotionally intelligent manner and work inteams effectively
4. Students will be able to solve questions based on non-verbal and analytical reasoning, datasufficiency and puzzle

**CO-PO Mapping:**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | | | | | | | | | 3 | 3 | | 2 | | | |
| CO2 | 2 | 2 | 2 | 3 | 2 | 1 | 2 | | 3 | 3 | | 3 | | | |
| CO3 | 2 | | 2 | 3 | | | | | 3 | 2 | 2 | 2 | | | |
| CO4 | 2 | 2 | 2 | 3 | | 1 | | | | | 2 | 3 | | | |
| CO5 | | | | | | | | | | | | | | | |

Note: 1 - Low Correlation 2 - Medium Correlation 3 - High Correlation

**APPROVED IN:**

**BOS :17-09-2021** **ACADEMIC COUNCIL:17-09-201**

**SDG No. & Statement:4**

Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all.

**SDG Justification:**

Emotional Intelligence and reasoning skills are essential for achieving inclusive and equitable education and lifelong learning opportunities for oneself and others.

| CLAD1011 | LEADERSHIP SKILLS & QUANTITATIVE APTITUDE (SOFT SKILLS 2) | L | T | P | S | J | C |
|---|---|---|---|---|---|---|---|
| | | 0 | 0 | 2 | 0 | 0 | 1 |
| **Pre-requisite** | None | | | | | | |
| **Co-requisite** | None | | | | | | |
| **Preferable exposure** | None | | | | | | |

**Course Description:**

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

**Course Educational Objectives:**

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

**List of Activities & Tasks for Assessment:**

| Unit | Topics | Hours |
|---|---|---|
| 1 | Communication Skills: The Communication Process, Elements of Interpersonal Communication, Non-Verbal Communication: Body Language, Posture, Eye Contact, Smile, Tone of Voice, Barriers to Communication. Effective Listening Skills: Active Listening, Passive | 5 |

| | | |
|---|---|---|
| | Listening, Asking Questions, Empathizing, Being Non-Judgmental, Being Open Minded, Mass Communication: Design of Posters, Advertisements, notices, writing formal and informal invitations | |
| 2 | Focus on Audience Needs, focus on the Core Message, Use Body Language andVoice, Start Strongly, Organizing Ideas & Using Visual Aids: SPAM Model, EffectiveOpening and Closing Techniques, Guy Kawasaki's Rule (10-20-30 Rule), Overcoming Stage Fear, Story Telling | 3 |
| 3 | Problem Solving & Decision Making: Difference Between the Two, Steps in RationalApproach to Problem Solving: Defining the Problem, Identifying the Root Causes, Generating Alternative Solutions, Evaluating and Selecting Solutions, Implementingand Following-Up, Case Studies | 3 |
| 4 | Group Discussion: Understanding GD, Evaluation Criteria, Nine Essential Qualities for Success, Positive and Negative Roles, Mind Mapping, structuring a Response, Methods of Generating Fresh Ideas | 4 |
| 5 | Number Theory: Number System, Divisibility rules, Remainders and LCM & HCF | 3 |
| 6 | Numerical Computation and Estimation - I: Chain Rule, Ratio Proportions, Partnerships & Averages, Percentages, Profit-Loss & Discounts, Mixtures, Problem on Numbers & ages | 6 |
| 7 | Data Interpretation: Interpretation and analysis of data in Tables, Caselets, Line- graphs, Pie-graphs, Boxplots, Scatterplots and Data Sufficiency | 3 |
| 8 | Mental Ability: Series (Number, Letter and Alphanumeric), Analogy (Number, Letter and Alphanumeric) and Classifications | 3 |

**References:**


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


**Course Outcomes:**

1. Students will be able to communicate 'one-on-one' and 'one-on-many' confidently using both verbal and non-verbal messages and deliver impressive talks/ presentations to a group both with and without the use of PPTs and create posters, advertisements, etc.
2. Students will be able to apply the rational model of problem solving and decision makingin their problem solving and decision-making efforts.
3. Students will be able to solve questions based on numbers and arithmetic given in

various competitive examinations

4. Students will be able to solve questions based on data interpretation, progressions, and series.

**CO-PO Mapping:**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | | | | | | 2 | | | 2 | 3 | | 2 | | | |
| CO2 | 2 | 2 | 3 | 2 | | 3 | 3 | | 3 | 3 | | 2 | | | |
| CO3 | 2 | 2 | 2 | 2 | | 2 | | | | | | 3 | | | |
| CO4 | 2 | 2 | 2 | 2 | | 2 | | | | | | | | | |
| CO5 | | | | | | | | | | | | | | | |

Note: 1 - Low Correlation 2 - Medium Correlation 3 - High Correlation

**APPROVED IN:**

**BOS :17-09-2021** **ACADEMIC COUNCIL:17-09-2021**

**SDG No. & Statement:4**

Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all.

**SDG Justification:**

Leadership and quantitative aptitude skills are essential skills for achieving inclusive and equitable education and lifelong learning opportunities for oneself and others.

| CLAD1021 | VERBAL ABILITY & QUANTITATIVE ABILITY (SOFT SKILLS 3) | L | T | P | S | J | C |
|---|---|---|---|---|---|---|---|
| | | 0 | 0 | 2 | 0 | 0 | 1 |
| **Pre-requisite** | None | | | | | | |
| **Co-requisite** | None | | | | | | |
| **Preferable exposure** | None | | | | | | |

**Course Description:**

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

**Course Educational Objectives:**

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

**List of Activities & Tasks for Assessment:**

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

2. **Reading Comprehension:** Advanced Reading Comprehension: Types of RC passages,

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

3. **Para Jumbles:** Coherence and Cohesion, Idea Organization Styles, Concept of Mandatory Pairs and Its Application: Transitional Words, Antecedent-Pronoun Reference, Article Reference, Cause and Effect, Chronological Order, General to Specify, Specify to General, Idea-Example, Idea-Explanation, Etc.
4. **Grammar Usage:** Rules Governing the Usage of Nouns, Pronouns, Adjectives, Adverbs, Conjunctions, Prepositions and Articles
5. **Numerical Computation and Estimation - II:** Time and Work, Pipes and Cisterns, Time and Distance, Problems on Trains, Boats and Streams, Races and Games of Skill, Simple Interest& Compound Interest
6. **Geometry:** Lines and Angles, Triangles, Quadrilaterals & Polygons, and Circles
7. **Mensuration:** 2-Dimensional Mensuration (Triangles, Quadrilaterals and Circles), 3-Dimensional Mensuration (Cubes, Cuboids, Cylinder, Cone, Sphere)

**References:**

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

**Course Outcomes:**

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

**CO-PO Mapping:**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | | | | | | | | | 1 | 3 | | 2 | | | |
| CO2 | | | | 2 | | 2 | | | | 2 | | 3 | | | |
| CO3 | | | | | | | | | 1 | 2 | | 3 | | | |
| CO4 | 2 | 2 | 3 | | | 2 | | | | | | 1 | | | |
| CO5 | | | | | | | | | | | | | | | |

Note: 1 - Low Correlation 2 - Medium Correlation 3 - High Correlation

**APPROVED IN:**

**BOS :17-09-2021** **ACADEMIC COUNCIL:17-09-2021**

**SDG No. & Statement:4**

Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all.

**SDG Justification:**

English language and quantitative aptitude skills are essential skills for achieving inclusive and equitable education and lifelong learning opportunities for oneself and others.

| CLAD1031 | PRACTICING VERBAL ABILITY & QUANTITATIVE APTITUDE (SOFT SKILLS 4) | L | T | P | S | J | C |
|---|---|---|---|---|---|---|---|
| | | 0 | 0 | 2 | 0 | 0 | 1 |
| **Pre-requisite** | None | | | | | | |
| **Co-requisite** | None | | | | | | |
| **Preferable exposure** | None | | | | | | |

**Course Description:**

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

**Course Educational Objectives:**

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

**List of Activities & Tasks for Assessment:**

1. Error Detection: Pronouns, Conjunctions, Prepositions and Articles
2. Error Detection: Tenses and their Uses
3. Sentence Correction: Subject-Verb Agreement, Antecedent-Pronoun Agreement, Conditional Clauses
4. Sentence Correction: Modifiers (Misplaced and Dangling) & Determiners, Parallelism & WordOrder, and Degrees of Comparison
5. Combinatorics: Permutations & Combinations, Probability

6. Crypt arithmetic & Modular Arithmetic: Crypt arithmetic, Application of Base System (7, 24),Clocks (Base 24), Calendars (Base 7)
7. Algebra: Exponents, Logarithms, Word-problems related to equations, Special Equations,Progressions, Statistics

**References:**


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


**Course Outcomes:**

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

**CO-PO Mapping:**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | | | | | | | | | 1 | 3 | | 1 | | | |
| CO2 | | | | | | | | | 1 | 3 | | 1 | | | |
| CO3 | | 2 | 3 | 2 | | 2 | | | | | | 2 | | | |
| CO4 | | 3 | 2 | 2 | | 2 | | | | | | 2 | | | |
| CO5 | | | | | | | | | | | | | | | |

Note: 1 - Low Correlation 2 - Medium Correlation 3 - High Correlation

**APPROVED IN:**

**BOS :17-09-2021** **ACADEMIC COUNCIL:17-09-2021**

**SDG No. & Statement:4**

Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all.

**SDG Justification:**

English language and quantitative aptitude skills are essential skills for achieving inclusive and equitable education and lifelong learning opportunities for oneself and others.

| CLAD2001 | PREPARATION FOR CAMPUS PLACMENT -1 (SOFT SKILLS 5A) | L | T | P | S | J | C |
|---|---|---|---|---|---|---|---|
| | | 0 | 0 | 2 | 0 | 0 | 1 |
| **Pre-requisite** | None | | | | | | |
| **Co-requisite** | None | | | | | | |
| **Preferable exposure** | None | | | | | | |

**Course Description:**

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

**Course Educational Objectives:**

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

**List of Activities & Tasks for Assessment:**

1. Career Preparedness: Resume & Cover Letter Writing, Interview Skills: Elevator Pitch, Making the First Impression, Being Other-Oriented, Being Positive and Curious, communicating with Confidence and Poise, Frequently Asked Questions & How to Answer Them, Pitfalls to Avoid, Etc. Etiquette: Hygiene, Courtesy, Culture differences, Workplace, use of cell phone, Profanity, Slang, Protocol.
2. Verbal Ability: Practicing Reading Comprehension, Error Detection, Sentence Completion, MCQs, FIBs, Para jumbles, Cloze Test, Critical Reasoning.
3. Quantitative Aptitude: Number Systems, Algebra, Geometry, Data Handling, Data Sufficiency, Word Problems
4. Reasoning: Logical and Verbal Reasoning

**References:**

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

**Course Outcomes:**

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

**CO-PO Mapping:**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | | | | | | | | | 3 | 2 | | 1 | | | |
| CO2 | | | | | | 3 | | | 2 | | | 1 | | | |
| CO3 | | | | | | 2 | | | 1 | 3 | | 3 | | | |
| CO4 | | 3 | | 2 | | 2 | | | 1 | | | 3 | | | |
| CO5 | | | | | | | | | | | | | | | |

Note: 1 - Low Correlation 2 - Medium Correlation 3 - High Correlation

**APPROVED IN:**

**BOS :17-09-2021** **ACADEMIC COUNCIL:17-09-2021**

**SDG No. & Statement:4**

Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all.

**SDG Justification:**

Quantitative aptitude, reasoning, verbal and language skills practiced during the preparation for campus placement tests provide essential skills for achieving inclusive and equitable education and lifelong learning opportunities for oneself and others.

| CLAD2011 | PREPARATION FOR HIGHER EDUCATION (GRE/ GMAT)-1 (SOFT SKILLS 5B) | L | T | P | S | J | C |
|---|---|---|---|---|---|---|---|
| | | 0 | 0 | 2 | 0 | 0 | 1 |
| **Pre-requisite** | None | | | | | | |
| **Co-requisite** | None | | | | | | |
| **Preferable exposure** | None | | | | | | |

**Course Description:**

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

**Course Educational Objectives:**

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

**List of Activities & Tasks for Assessment:**

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

**References:**

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

**Course Outcomes:**

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

**CO-PO Mapping:**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | | 2 | 2 | 2 | | | | | 3 | | | 3 | | | |
| CO2 | | 2 | 2 | 2 | | | | | 3 | | | 3 | | | |
| CO3 | | | | | | | | | | | | | | | |
| CO4 | | | | | | | | | | | | | | | |
| CO5 | | | | | | | | | | | | | | | |

Note: 1 - Low Correlation 2 - Medium Correlation 3 - High Correlation

**APPROVED IN:**

**BOS :17-09-2021** **ACADEMIC COUNCIL:17-09-2021**

**SDG No. & Statement:4**

Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all.

**SDG Justification:**

Quantitative aptitude, reasoning, verbal and language skills practiced during the preparation for GRE/GMAT tests provide essential skills for achieving inclusive and equitable education and lifelong learning opportunities for oneself and others.

| CLAD2021 | PREPARATION FOR CAT/ MAT – 1 (SOFT SKILLS 5C) | L | T | P | S | J | C |
|---|---|---|---|---|---|---|---|
| | | 0 | 0 | 2 | 0 | 0 | 1 |
| **Pre-requisite** | None | | | | | | |
| **Co-requisite** | None | | | | | | |
| **Preferable exposure** | None | | | | | | |

**Course Description:**

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

**Course Educational Objectives:**

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

**List of Activities & Tasks for Assessment:**

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

**References:**

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

**Course Outcomes:**

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

**CO-PO Mapping:**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | 2 | 2 | 2 | | 2 | | | 3 | 3 | 3 | 3 | | | |
| CO2 | 2 | 2 | 2 | 2 | | 1 | | | 2 | | 2 | 3 | | | |
| CO3 | | | | | | | | | | | | | | | |
| CO4 | | | | | | | | | | | | | | | |
| CO5 | | | | | | | | | | | | | | | |

Note: 1 - Low Correlation 2 - Medium Correlation 3 - High Correlation

**APPROVED IN:**

**BOS :17-09-2021** **ACADEMIC COUNCIL:17-09-2021**

**SDG No. & Statement:4**

Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all.

**SDG Justification:**

Quantitative aptitude, reasoning, verbal and language skills practiced during the preparation for CAT/ MAT tests provide essential skills for achieving inclusive and equitable education and lifelong learning opportunities for oneself and others.

| CLAD2031 | PREPARATION FOR CAMPUS PLACEMENT-2 (SOFT SKILLS 6A) | L | T | P | S | J | C |
|---|---|---|---|---|---|---|---|
| | | 0 | 0 | 2 | 0 | 0 | 1 |
| **Pre-requisite** | None | | | | | | |
| **Co-requisite** | None | | | | | | |
| **Preferable exposure** | None | | | | | | |

**Course Description:**

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

**Course Educational Objectives:**

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

**List of Activities & Tasks for Assessment:**

1. Career Preparedness II: Mock Interviews, Feedback and Placement Readiness
2. Verbal Ability II: Practising Reading Comprehension, Error Detection, Sentence Completion, MCQs, FIBs, Para jumbles, Cloze Test, Critical Reasoning
3. Quantitative Aptitude II: Number Systems, Algebra, Geometry, Data Handling,Data Sufficiency, Word Problems
4. Reasoning II: Logical and Verbal Reasoning

**References:**

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

**Course Outcomes:**

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

**CO-PO Mapping:**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | | | | | | | | | 2 | 3 | | 2 | | | |
| CO2 | 2 | 2 | 2 | 3 | | 3 | | | 2 | 2 | 3 | 2 | | | |
| CO3 | 2 | 2 | 2 | 3 | | 2 | | | 1 | | 2 | 3 | | | |
| CO4 | | | | | | | | | | | | | | | |
| CO5 | | | | | | | | | | | | | | | |

Note: 1 - Low Correlation 2 - Medium Correlation 3 - High Correlation

**APPROVED IN:**

**BOS :17-09-2021** **ACADEMIC COUNCIL:17-09-2021**

**SDG No. & Statement:4**

Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all.

**SDG Justification:**

Quantitative aptitude, reasoning, verbal and language skills practiced during the preparation for campus placement tests provide essential skills for achieving inclusive and equitable education and lifelong learning opportunities for oneself and others.

| CLAD2041 | PREPARATION FOR HIGHER EDUCATION (GRE/GMAT)-2 (SOFT SKILLS 6B) | L | T | P | S | J | C |
|---|---|---|---|---|---|---|---|
| | | 0 | 0 | 2 | 0 | 0 | 1 |
| **Pre-requisite** | None | | | | | | |
| **Co-requisite** | None | | | | | | |
| **Preferable exposure** | None | | | | | | |

**Course Description:**

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

**Course Educational Objectives:**

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

**List of Activities & Tasks for Assessment:**

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

**References:**

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

**Course Outcomes:**

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

**CO-PO Mapping:**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | | 2 | | 3 | | 2 | | | 2 | 2 | 2 | 2 | | | |
| CO2 | | 2 | | 2 | | 2 | | | 2 | 2 | 2 | 2 | | | |
| CO3 | | | | | | | | | | | | | | | |
| CO4 | | | | | | | | | | | | | | | |
| CO5 | | | | | | | | | | | | | | | |

Note: 1 - Low Correlation 2 - Medium Correlation 3 - High Correlation

**APPROVED IN:**

**BOS :17-09-2021** **ACADEMIC COUNCIL:17-09-2021**

**SDG No. & Statement:4**

Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all.

**SDG Justification:**

Quantitative aptitude, reasoning, verbal and language skills practiced during the preparation for GRE/GMAT tests provide essential skills for achieving inclusive and equitable education and lifelong learning opportunities for oneself and others.

| CLAD2051 | PREPARATION FOR CAT/ MAT – 2 (SOFT SKILLS 6C) | L | T | P | S | J | C |
|---|---|---|---|---|---|---|---|
| | | 0 | 0 | 2 | 0 | 0 | 1 |
| **Pre-requisite** | None | | | | | | |
| **Co-requisite** | None | | | | | | |
| **Preferable exposure** | None | | | | | | |

**Course Description:**

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

**Course Educational Objectives:**

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

**List of Activities & Tasks for Assessment:**

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

**References:**

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

**Course Outcomes:**

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

**CO-PO Mapping:**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | 3 | | 3 | | | | | 3 | 3 | 3 | 2 | | | |
| CO2 | 1 | 2 | | 2 | | | | | 2 | 3 | 2 | 2 | | | |
| CO3 | | | | | | | | | | | | | | | |
| CO4 | | | | | | | | | | | | | | | |
| CO5 | | | | | | | | | | | | | | | |

Note: 1 - Low Correlation 2 - Medium Correlation 3 - High Correlation

**APPROVED IN:**

**BOS :17-09-2021** **ACADEMIC COUNCIL:17-09-2021**

**SDG No. & Statement:4**

Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all.

**SDG Justification:**

Quantitative aptitude, reasoning, verbal and language skills practiced during the preparation for CAT/ MAT tests provide essential skills for achieving inclusive and equitable education and lifelong learning opportunities for oneself and others.

| DOSL1001 | CLUB ACTIVITY – PARTICIPANT | L | T | P | S | J | C |
|---|---|---|---|---|---|---|---|
| | | 0 | 0 | 0 | 2 | 0 | 2 |
| **Pre-requisite** | None | | | | | | |
| **Co-requisite** | None | | | | | | |
| **Preferable exposure** | None | | | | | | |

**Course Description:**

*This course recognizes student participation in multiple activities organized by various student organizations that pursue specific co-curricular and extra-curricular interests. These activities allow students to engage in and identify and pursue their personal interests and hobbies.*

**Course Educational Objectives:**

- Create opportunities for students to participate in a variety of non-academic experiences
- Interact with and learn from peers in a setting without an external performance pressure
- Allow exploration of interesting activities and reflection about these experiences
- Learn to manage time effectively

**List of Student Club Activities:**

1. Music (vocals, instruments, technical, recording, mixing, production, management)
2. Dance (Indian classical, western, jazz, latin, contemporary, folk, production, event management)
3. Theatre (classical, experimental, one-act, street, production, direction, casting, etc.)
4. Arts (fine arts, painting, calligraphy, sketching, caricaturing, etc)
5. Craft (origami, model making, sculpture, pottery, etc)
6. Cooking (home-style, baking, confectionery, Indian, intercontinental, etc.)
7. Graffiti (street, mural, collage, multi media, etc)
8. Workshops, quizzes, debates, elocution, etc
9. Filmmaking (adventure, drama, film appreciation, documentary, etc)
10. Photography (conventional, immersive (360), landscape, portrait, technical, editing, etc.)
11. College Fests
12. Designing (graphic design, landscape, interior, etc)
13. Competitive coding
14. Recreational sports activities
15. Other club activities organized by student clubs

**List of Activities:**

1. Participation in various club-based activities
2. Weekly reflection paper
3. Portfolio (on social media using an Instagram account)
4. Two learning papers (one per semester)

**Textbooks:**

1. Small move: big Change (Caroline Arnold)
2. How to Win at College: Surprising Secrets for Success from the Country's Top Students (Cal Newport)

**References:**

1. Making the most of college: Students speak their minds (author - Richard Light)
2. Failing Forward: Turning Mistakes into Stepping Stones for Success (John C Maxwell)
3. The Last Lecture (Randy Pausch)
4. Lean in (Sheryl Sandberg)
5. YouTube- Introduction to various club activities

**Course Outcomes:**

Upon successful completion of the course, student will be able to

1. Identify personal interest areas
2. Learn from diverse perspectives and experiences
3. Gain exposure to various activities and opportunities for extra-curicular activities
4. Learn to manage time effectively
5. gain confidence

**CO-PO Mapping:**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | | | | | | | | 3 | 3 | 2 | 3 | 2 | | | |
| CO2 | | | | | | | | | 3 | 3 | | 2 | | | |
| CO3 | | | | | | | | | 3 | 3 | 2 | 3 | | | |
| CO4 | | | | | | | | | 3 | 3 | | 3 | | | |
| CO5 | | | | | | | | 3 | 3 | 3 | | 2 | | | |

Note: 1 - Low Correlation 2 - Medium Correlation 3 - High Correlation

**APPROVED IN:**

**BOS :19-07-2021** **ACADEMIC COUNCIL:19-07-2021**

**SDG No. & Statement:**

SDG 4: Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all.

**SDG Justification:**

This course recognizes student participation in non-academic events and activities which focus on inclusive partnerships and collaborations with all stakeholders by using all sustainable means to promote lifelong learning.

| DOSL1011 | CLUB ACTIVITY – MEMBER OF THE CLUB | L | T | P | S | J | C |
|---|---|---|---|---|---|---|---|
| | | 0 | 0 | 0 | 2 | 0 | 2 |
| **Pre-requisite** | None | | | | | | |
| **Co-requisite** | None | | | | | | |
| **Preferable exposure** | None | | | | | | |

**Course Description:**

*This course encourages and acknowledges student members' work in organizing events and activities organized by various student organizations that pursue specific co-curricular and extra- curricular interests. These activities allow students to actively learn from the process of conceptualizing and organizing such activities as part of a team.*

**Course Educational Objectives:**

- Create opportunities for students to learn from organizing club activities
- Learn teamwork, leadership, planning and management of events and activities
- Learn to appreciate multiple perspectives, cultures, and individual capabilities
- Learn to manage time effectively

**List of Student Club Activities:**

1. Music (vocals, instruments, technical, recording, mixing, production, management)
2. Dance (Indian classical, western, jazz, latin, contemporary, folk, production, event management)
3. Theatre (classical, experimental, one-act, street, production, direction, casting, etc.)
4. Arts (fine arts, painting, calligraphy, sketching, caricaturing, etc)
5. Craft (origami, model making, sculpture, pottery, etc)
6. Cooking (home-style, baking, confectionery, Indian, intercontinental, etc.)
7. Graffiti (street, mural, collage, multi media, etc)
8. Workshops, quizzes, debates, elocution, etc
9. Filmmaking (adventure, drama, film appreciation, documentary, etc)
10. Photography (conventional, immersive (360), landscape, portrait, technical, editing, etc.)
11. College Fests
12. Designing (graphic design, landscape, interior, etc)
13. Competitive coding
14. Recreational sports activities
15. Other club activities organized by student clubs

**List of Activities:**

1. Be a member of a club and organize activities in that particular interest area
2. Learn from diverse perspectives and experiences
3. Learn to design and execute extra-curricular activities
4. Develop management skills through hands on experience
5. Explore different managerial roles and develop competencies

**Textbooks:**

1. Small move: big Change (Caroline Arnold)
2. How to Win at College: Surprising Secrets for Success from the Country's Top Students (Cal Newport)

**References:**

1. Making the most of college: Students speak their minds (author - Richard Light)
2. Failing Forward: Turning Mistakes into Stepping Stones for Success (John C Maxwell)
3. The Last Lecture (Randy Pausch)
4. Lean in (Sheryl Sandberg)
5. Youtube- Introduction to various club activities

**Course Outcomes:**

Upon successful completion of the course, student will be able to

- Be a member of a club and organize activities in that particular interest area
- Learn from diverse perspectives and experiences
- Learn to design and execute extra-curricular activities
- Develop management skills through hands on experience
- Explore different managerial roles and develop competencies

**CO-PO Mapping:**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | | | | | | | | 3 | 3 | 3 | | 3 | | | |
| CO2 | | | | | | | | | 3 | 2 | | 3 | | | |
| CO3 | | | | | | | | 3 | 3 | 2 | | | | | |
| CO4 | | | | | | | | | | 2 | 3 | 3 | | | |
| CO5 | | | | | | | | 2 | | | | 3 | | | |

Note: 1 - Low Correlation 2 - Medium Correlation 3 - High Correlation

**APPROVED IN:**

**BOS :19-07-2021** **ACADEMIC COUNCIL:19-07-2021**

**SDG No. & Statement:**

SDG 16: Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels

SDG17 : Strengthen the means of implementation and revitalize the global partnership for sustainable development

**SDG Justification:**

This course recognizes student participation in community service endeavours focussing on sustainable development, service to communities. This allows students to develop empathy, citizenship behaviour and inclusive community values.

| DOSL1021 | CLUB ACTIVITY – LEADER OF THE CLUB | L | T | P | S | J | C |
|---|---|---|---|---|---|---|---|
| | | 0 | 0 | 0 | 2 | 0 | 2 |
| **Pre-requisite** | None | | | | | | |
| **Co-requisite** | None | | | | | | |
| **Preferable exposure** | None | | | | | | |

**Course Description:**

*This course encourages and recognizes student members' work in leading the student organizationsthrough various leadership roles. As leaders they work not just to organize events and activities in specific co-curricular and extra-curricular interests, but also lead the teams that form the core members of the clubs. These activities allow students to learn and practice leadership and management skills through real world experience.*

**Course Educational Objectives:**

- Create opportunities for students to learn from organizing club activities
- Learn teamwork, leadership, planning and management of events and activities
- Learn to appreciate multiple perspectives, cultures, and individual capabilities
- Learn to manage time effectively

**List of Student Club Activities:**

1. Music (vocals, instruments, technical, recording, mixing, production, management)
2. Dance (Indian classical, western, jazz, latin, contemporary, folk, production, event management)
3. Theatre (classical, experimental, one-act, street, production, direction, casting, etc.)
4. Arts (fine arts, painting, calligraphy, sketching, caricaturing, etc)
5. Craft (origami, model making, sculpture, pottery, etc)
6. Cooking (home-style, baking, confectionery, Indian, intercontinental, etc.)
7. Graffiti (street, mural, collage, multimedia, etc)
8. Workshops, quizzes, debates, elocution, etc
9. Filmmaking (adventure, drama, film appreciation, documentary, etc)
10. Photography (conventional, immersive (360), landscape, portrait, technical, editing, etc.)
11. College Fests
12. Designing (graphic design, landscape, interior, etc)
13. Competitive coding
14. Recreational sports activities
15. Other club activities organized by student clubs

**List of Activities:**

1. Be the leader of the club and implement the charter, vision and mission of the club
2. Learn from diverse perspectives and experiences
3. Learn to lead the team, design and execute extra-curricular activities
4. Develop management skills through hands on experience
5. Explore different managerial roles and develop competencies

**Textbooks:**

1. Small move: big Change (Caroline Arnold)
2. How to Win at College: Surprising Secrets for Success from the Country's Top Students(Cal Newport)

**References:**

1. Making the most of college: Students speak their minds (author - Richard Light)
2. Failing Forward: Turning Mistakes into Stepping Stones for Success (John C Maxwell)
3. The Last Lecture (Randy Pausch)
4. Lean in (Sheryl Sandberg)
5. Youtube- Introduction to various club activities

**Course Outcomes:**

Upon successful completion of the course, student will be able to

- Be the leader of the club and implement the charter, vision and mission of the club
- Learn from diverse perspectives and experiences
- Learn to lead the team, design and execute extra-curricular activities
- Develop management skills through hands on experience
- Explore different managerial roles and develop competencies

**CO-PO Mapping:**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | | | | | | | | 3 | 3 | 3 | | 3 | | | |
| CO2 | | | | | | | | | 3 | 2 | | 3 | | | |
| CO3 | | | | | | | | 3 | 3 | 2 | | | | | |
| CO4 | | | | | | | | | | 2 | 3 | 3 | | | |
| CO5 | | | | | | | | 2 | | | | 3 | | | |

Note: 1 - Low Correlation 2 - Medium Correlation 3 - High Correlation

**APPROVED IN:**

**BOS :19-07-2021** **ACADEMIC COUNCIL:19-07-2021**

**SDG No. & Statement:**

SDG 16: Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels

SDG17 : Strengthen the means of implementation and revitalize the global partnership for sustainable development

**SDG Justification:**

This course recognizes student participation in community service endeavours focussing on sustainable development, service to communities. This allows students to develop empathy, citizenship behaviour and inclusive community values.

| DOSL1031 | CLUB ACTIVITY – COMPETITOR | L | T | P | S | J | C |
|---|---|---|---|---|---|---|---|
| | | 0 | 0 | 0 | 2 | 0 | 2 |
| **Pre-requisite** | None | | | | | | |
| **Co-requisite** | None | | | | | | |
| **Preferable exposure** | None | | | | | | |

**Course Description:**

*This course encourages and recognizes student members' work in leading the student organizationsthrough various leadership roles. As leaders they work not just to organize events and activities in specific co-curricular and extra-curricular interests, but also lead the teams that form the core members of the clubs. These activities allow students to learn and practice leadership and management skills through real world experience.*

**Course Educational Objectives:**

- Create opportunities for students to learn from organizing club activities
- Learn teamwork, leadership, planning and management of events and activities
- Learn to appreciate multiple perspectives, cultures, and individual capabilities
- Learn to manage time effectively

**List of Student Club Activities:**

1. Music (vocals, instruments, technical, recording, mixing, production, management)
2. Dance (Indian classical, western, jazz, latin, contemporary, folk, production, event management)
3. Theatre (classical, experimental, one-act, street, production, direction, casting, etc.)
4. Arts (fine arts, painting, calligraphy, sketching, caricaturing, etc)
5. Craft (origami, model making, sculpture, pottery, etc)
6. Cooking (home-style, baking, confectionery, Indian, intercontinental, etc.)
7. Graffiti (street, mural, collage, multimedia, etc)
8. Workshops, quizzes, debates, elocution, etc
9. Filmmaking (adventure, drama, film appreciation, documentary, etc)
10. Photography (conventional, immersive (360), landscape, portrait, technical, editing, etc.)
11. College Fests
12. Designing (graphic design, landscape, interior, etc)
13. Competitive coding
14. Recreational sports activities
15. Other club activities organized by student clubs

**List of Activities:**

1. Be the leader of the club and implement the charter, vision and mission of the club
2. Learn from diverse perspectives and experiences
3. Learn to lead the team, design and execute extra-curicular activities
4. Develop management skills through hands on experience
5. Explore different managerial roles and develop competencies

**Textbooks:**

1. Small move: big Change (Caroline Arnold)
2. How to Win at College: Surprising Secrets for Success from the Country's Top Students (Cal Newport)

**References:**

1. Making the most of college: Students speak their minds (author - Richard Light)
2. Failing Forward: Turning Mistakes into Stepping Stones for Success (John C Maxwell)
3. The Last Lecture (Randy Pausch)
4. Lean in (Sheryl Sandberg)
5. Youtube- Introduction to various club activities

**Course Outcomes:**

Upon successful completion of the course, student will be able to

1. Be the leader of the club and implement the charter, vision and mission of the club
2. Learn from diverse perspectives and experiences
3. Learn to lead the team, design and execute extra-curricular activities
4. Develop management skills through hands on experience
5. Explore different managerial roles and develop competencies

**CO-PO Mapping:**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | | | | | | | | 3 | 3 | 3 | | 3 | | | |
| CO2 | | | | | | | | | 3 | 2 | | 3 | | | |
| CO3 | | | | | | | | 3 | 3 | 2 | | | | | |
| CO4 | | | | | | | | | | 2 | 3 | 3 | | | |
| CO5 | | | | | | | | 2 | | | | 3 | | | |

Note: 1 - Low Correlation 2 - Medium Correlation 3 - High Correlation

**APPROVED IN:**

**BOS :19-07-2021** **ACADEMIC COUNCIL:19-07-2021**

**SDG No. & Statement:**

SDG 16: Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels

SDG17 : Strengthen the means of implementation and revitalize the global partnership for sustainable development

**SDG Justification:**

This course recognizes student participation in community service endeavours focussing on sustainable development, service to communities. This allows students to develop empathy, citizenship behaviour and inclusive community values.

| DOSL1041 | COMMUNITY SERVICES - VOLUNTEER | L | T | P | S | J | C |
|---|---|---|---|---|---|---|---|
| | | 0 | 0 | 0 | 0 | 2 | 2 |
| **Pre-requisite** | None | | | | | | |
| **Co-requisite** | None | | | | | | |
| **Preferable exposure** | None | | | | | | |

**Course Description:**

*This course recognizes student participation in Community service activities organized by various student organizations and other Government and non-government organizations that exist for providing service to communities. These activities allow students to develop empathy, citizenship behavior and community values.*

**Course Educational Objectives:**

- To help students develop empathy and citizenship behavior
- Enable students to develop an altruistic attitude and community development sensibility
- Allow exploration of community service activities and reflect about these experiences
- Learn to work in small and large teams for achieving community objectives

**List of Community Service Activities:**

1. Community Health Services
2. Swachh Bharat Abhiyan and other Cleanliness drives
3. Tree Plantation and similar environmental conservation initiatives
4. Rain water harvesting awareness and implementation
5. Fundraising and visits to Orphanages, Old-age homes, etc.
6. Health and disease awareness programs
7. Working with NGOs
8. Disaster mitigation and management training and relief work
9. Rural Upliftment projects
10. Campus awareness and action projects (cleanliness, anti-ragging, blood donation, etc)
11. Community investigations and surveys for development research
12. Educational support for underprivileged (remedial classes, coaching, training, etc)
13. Service camps
14. Advocacy and information literacy initiatives
15. Other activities serving local communities

**List of Activities:**

1. Participation in various community service activities
2. Weekly reflection paper
3. Portfolio (on social media using an instagram account)
4. Two learning papers (one per semester)

**Text Books:**

1. Soul of a citizen: living with conviction in Challenging times (author: Paul Rogat Loeb)
2. Community Services intervention: Vera Lloyd

**References:**

1. A path appears: Transforming lives, creating opportunities (Nicholas Kristof and SherylWuDunn)
2. The story of My Experiments with Truth (author: M. K. Gandhi)

**Course Outcomes:**

1. Experience of volunteering in a variety of Community service activities
2. Gaining empathy for lesser privileged sections of society by experience
3. Understanding the process of generating community awareness
4. Understanding Disaster management and relief through training and experience
5. Developing environmental and sustainability awareness

**CO-PO Mapping:**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | | | | | | | | 3 | 3 | 3 | | 3 | | | |
| CO2 | | | | | | | | | 3 | 2 | | 3 | | | |
| CO3 | | | | | | | | 3 | 3 | 2 | | | | | |
| CO4 | | | | | | | | | | 2 | 3 | 3 | | | |
| CO5 | | | | | | | | 2 | | | | 3 | | | |

Note: 1 - Low Correlation 2 - Medium Correlation 3 - High Correlation

**APPROVED IN:**

**BOS :19-07-2021** **ACADEMIC COUNCIL:19-07-2021**

**SDG No. & Statement:**

SDG 16: Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels

SDG17 : Strengthen the means of implementation and revitalize the global partnership for sustainable development

**SDG Justification:**

This course recognizes student participation in community service endeavours focussing on sustainable development, service to communities. This allows students to develop empathy, citizenship behaviour and inclusive community values.

| DOSL1051 | COMMUNITY SERVICES - MOBILIZER | L | T | P | S | J | C |
|---|---|---|---|---|---|---|---|
| | | 0 | 0 | 0 | 0 | 2 | 2 |
| **Pre-requisite** | None | | | | | | |
| **Co-requisite** | None | | | | | | |
| **Preferable exposure** | None | | | | | | |

**Course Description:**

*This course recognizes student leadership in mobilizing community service activities as members of various student organizations or other Government and non-government organizations that existfor providing service to communities. These activities allow students to develop leadership, management skills, empathy, citizenship behavior and community values.*

**Course Educational Objectives:**

- To help students understand leadership in a community environment
- Enable students to develop an altruistic attitude and community development sensibility
- Allow deep understanding of community service through practical experience
- Learn to lead small and large teams for achieving community objectives

**List of Community Service Activities:**

1. Community Health Services
2. Swachh Bharat Abhiyan and other Cleanliness drives
3. Tree Plantation and similar environmental conservation initiatives
4. Rain water harvesting awareness and implementation
5. Fundraising and visits to Orphanages, Old-age homes, etc.
6. Health and disease awareness programs
7. Working with NGOs
8. Disaster mitigation and management training and relief work
9. Rural Upliftment projects
10. Campus awareness and action projects (cleanliness, anti-ragging, blood donation, etc)
11. Community investigations and surveys for development research
12. Educational support for underprivileged (remedial classes, coaching, training, etc)
13. Service camps
14. Advocacy and information literacy initiatives
15. Other activities serving local communities

**List of Activities:**

1. Organizing and leading teams in various community service activities
2. Fortnightly reflection paper
3. Portfolio (on social media using an instagram account)
4. Two learning papers (one per semester)

**Textbooks:**

1. Soul of a citizen: living with conviction in Challenging times (author: Paul Rogat Loeb)
2. Community Services intervention: Vera Lloyd

**References:**

1. A path appears: Transforming lives, creating opportunities (Nicholas Kristof and SherylWuDunn)
2. The story of My Experiments with Truth (author: M. K. Gandhi)
3. List of student run and other Government and non- government community service organizations

**Course Outcomes:**

1. Experience of mobilizing and executing Community service activities
2. Providing opportunities for community service volunteering for other fellowstudents
3. Understanding the process of mobilizing cash, kind and volunteer support
4. Building leadership and management skills
5. Building empathy and citizenship behavior

**CO-PO Mapping:**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | | | | | | | | 3 | 3 | 3 | | 3 | | | |
| CO2 | | | | | | | | | 3 | 2 | | 3 | | | |
| CO3 | | | | | | | | 3 | 3 | 2 | | | | | |
| CO4 | | | | | | | | | | 2 | 3 | 3 | | | |
| CO5 | | | | | | | | 2 | | | | 3 | | | |

Note: 1 - Low Correlation 2 - Medium Correlation 3 - High Correlation

**APPROVED IN:**

**BOS :19-07-2021** **ACADEMIC COUNCIL:19-07-2021**

**SDG No. & Statement:**

SDG 16: Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels

SDG17 : Strengthen the means of implementation and revitalize the global partnership for sustainable development

**SDG Justification:**

This course recognizes student participation in community service endeavours focussing on sustainable development, service to communities. This allows students to develop empathy, citizenship behaviour and inclusive community values.

| DOSP1001 | BADMINTON | L | T | P | S | J | C |
|---|---|---|---|---|---|---|---|
| | | 0 | 0 | 0 | 2 | 0 | 2 |
| **Pre-requisite** | None | | | | | | |
| **Co-requisite** | None | | | | | | |
| **Preferable exposure** | None | | | | | | |

**Course Description:**

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

**Course Educational Objectives:**

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

**List of Activities:**

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

**Instructional Plan:**

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

**References:**

1. Handbook of the Badminton World Federation (BWF)

**Course Outcomes:**

1. Learn to play Badminton
2. Understanding of the fundamental concepts such as rules of play, game variations
3. Understanding of the governing structure and administration of the sport
4. Understand the event management of the sport
5. Apply sport concepts into an active physical lifestyle

**CO-PO Mapping:**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | | | | | | | | | 3 | 2 | | 3 | | | |
| CO2 | | | | | | | | | | | | 2 | | | |
| CO3 | | | | | | | | | | | | 2 | | | |
| CO4 | | | | | | | 2 | | 3 | 3 | 2 | | | | |
| CO5 | | | | | | 2 | 2 | | 3 | | | 3 | | | |

Note: 1 - Low Correlation 2 - Medium Correlation 3 - High Correlation

**APPROVED IN:**

**BOS :19-07-2021** **ACADEMIC COUNCIL:19-07-2021**

**SDG No. & Statement:4**

Good Health and Well-being: Ensure healthy lives and promote well-being for all at all ages.

**SDG Justification:**

The nature of the course facilitates students to engage in various forms of fitness activities and sports-related movements that work on their overall health and wellness. The course focuses on inculcating active living as a lifestyle by making sports fun, engaging and meaningful.

| DOSP1011 | CHESS | L | T | P | S | J | C |
|---|---|---|---|---|---|---|---|
| | | 0 | 0 | 0 | 2 | 0 | 2 |
| **Pre-requisite** | None | | | | | | |
| **Co-requisite** | None | | | | | | |
| **Preferable exposure** | None | | | | | | |

**Course Description:**

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

**Course Educational Objectives:**

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

**List of Activities:**

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

**Instructional Plan:**

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

**References:**

1. International Chess Federation (FIDE) Handbook

**Course Outcomes:**

1. Learn to play Chess
2. Understanding of the fundamental concepts such as rules of play, game variations
3. Understanding of the governing structure and administration of the sport
4. Understand the event management of the sport
5. Apply sport concepts into an active physical lifestyle

**CO-PO Mapping:**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | | | | | | | | | 3 | 2 | | 3 | | | |
| CO2 | | | | | | | | | | | | 2 | | | |
| CO3 | | | | | | | | | | | | 2 | | | |
| CO4 | | | | | | | 2 | | 3 | 3 | 2 | | | | |
| CO5 | | | | | | 2 | 2 | | 3 | | | 3 | | | |

Note: 1 - Low Correlation 2 - Medium Correlation 3 - High Correlation

**APPROVED IN:**

**BOS :19-07-2021** **ACADEMIC COUNCIL:19-07-2021**

**SDG No. & Statement:4**

Good Health and Well-being: Ensure healthy lives and promote well-being for all at all ages.

**SDG Justification:**

The nature of the course facilitates students to engage in various forms of fitness activities and sports-related movements that work on their overall health and wellness. The course focuses on inculcating active living as a lifestyle by making sports fun, engaging and meaningful.

| DOSP1021 | CARROM | L | T | P | S | J | C |
|---|---|---|---|---|---|---|---|
| | | 0 | 0 | 0 | 2 | 0 | 2 |
| **Pre-requisite** | None | | | | | | |
| **Co-requisite** | None | | | | | | |
| **Preferable exposure** | None | | | | | | |

**Course Description:**

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

**Course Educational Objectives:**

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

**List of Activities:**

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

**Instructional Plan:**

1. Introduction to Carrom - History and development
2. Rules of the Game, Board components & dimensions
3. Fundamental Skills - Carrom: - Striking
4. Gameplay – General
5. Preparatory Drills and Fun Games
6. Game Variations: Singles/ Doubles/ Mixed
7. Preparatory Drills and Fun Games

**References:**

1. Indian Carrom Federation Handbook - Laws

**Course Outcomes:**

1. Learn to play Carrom
2. Understanding of the fundamental concepts such as rules of play, game variations

3. Understanding of the governing structure and administration of the sport
4. Understand the event management of the sport
5. Apply sport concepts into an active physical lifestyle

**CO-PO Mapping:**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | | | | | | | | | 3 | 2 | | 3 | | | |
| CO2 | | | | | | | | | | | | 2 | | | |
| CO3 | | | | | | | | | | | | 2 | | | |
| CO4 | | | | | | | 2 | | 3 | 3 | 2 | | | | |
| CO5 | | | | | | 2 | 2 | | 3 | | | 3 | | | |

Note: 1 - Low Correlation 2 - Medium Correlation 3 - High Correlation

**APPROVED IN:**

**BOS :19-07-2021** **ACADEMIC COUNCIL:19-07-2021**

**SDG No. & Statement:4**

Good Health and Well-being: Ensure healthy lives and promote well-being for all at all ages.

**SDG Justification:**

The nature of the course facilitates students to engage in various forms of fitness activities and sports-related movements that work on their overall health and wellness. The course focuses on inculcating active living as a lifestyle by making sports fun, engaging and meaningful.

| DOSP1031 | FOOTBALL | L | T | P | S | J | C |
|---|---|---|---|---|---|---|---|
| | | 0 | 0 | 0 | 2 | 0 | 2 |
| **Pre-requisite** | None | | | | | | |
| **Co-requisite** | None | | | | | | |
| **Preferable exposure** | None | | | | | | |

**Course Description:**

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

**Course Educational Objectives:**

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

**List of Activities:**

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

**Instructional Plan:**

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

**References:**

1. FIFA Laws of the Game

**Course Outcomes:**

1. Learn to play Football
2. Understanding of the fundamental concepts such as rules of play, game variations
3. Understanding of the governing structure and administration of the sport
4. Understand the event management of the sport
5. Apply sport concepts into an active physical lifestyle

**CO-PO Mapping:**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | | | | | | | | | 3 | 2 | | 3 | | | |
| CO2 | | | | | | | | | | | | 2 | | | |
| CO3 | | | | | | | | | | | | 2 | | | |
| CO4 | | | | | | | 2 | | 3 | 3 | 2 | | | | |
| CO5 | | | | | | 2 | 2 | | 3 | | | 3 | | | |

Note: 1 - Low Correlation 2 - Medium Correlation 3 - High Correlation

**APPROVED IN:**

**BOS :19-07-2021** **ACADEMIC COUNCIL:19-07-2021**

**SDG No. & Statement:4**

Good Health and Well-being: Ensure healthy lives and promote well-being for all at all ages.

**SDG Justification:**

The nature of the course facilitates students to engage in various forms of fitness activities and sports-related movements that work on their overall health and wellness. The course focuses on inculcating active living as a lifestyle by making sports fun, engaging and meaningful.

| DOSP1041 | VOLLEYBALL | L | T | P | S | J | C |
|---|---|---|---|---|---|---|---|
| | | 0 | 0 | 0 | 2 | 0 | 2 |
| **Pre-requisite** | None | | | | | | |
| **Co-requisite** | None | | | | | | |
| **Preferable exposure** | None | | | | | | |

**Course Description:**

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

**Course Educational Objectives:**

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

**List of Activities:**

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

**Instructional Plan:**

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

**References:**

1. FIVB - Official Volleyball Rules

**Course Outcomes:**

1. Learn to play Volleyball
2. Understanding of the fundamental concepts such as rules of play, game variations
3. Understanding of the governing structure and administration of the sport
4. Understand the event management of the sport
5. Apply sport concepts into an active physical lifestyle

**CO-PO Mapping:**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | | | | | | | | | 3 | 2 | | 3 | | | |
| CO2 | | | | | | | | | | | | 2 | | | |
| CO3 | | | | | | | | | | | | 2 | | | |
| CO4 | | | | | | | 2 | | 3 | 3 | 2 | | | | |
| CO5 | | | | | | 2 | 2 | | 3 | | | 3 | | | |

Note: 1 - Low Correlation 2 - Medium Correlation 3 - High Correlation

**APPROVED IN:**

**BOS :19-07-2021** **ACADEMIC COUNCIL:19-07-2021**

**SDG No. & Statement:4**

Good Health and Well-being: Ensure healthy lives and promote well-being for all at all ages.

**SDG Justification:**

The nature of the course facilitates students to engage in various forms of fitness activities and sports-related movements that work on their overall health and wellness. The course focuses on inculcating active living as a lifestyle by making sports fun, engaging and meaningful.

| DOSP1051 | KABADDI | L | T | P | S | J | C |
|---|---|---|---|---|---|---|---|
| | | 0 | 0 | 0 | 2 | 0 | 2 |
| **Pre-requisite** | None | | | | | | |
| **Co-requisite** | None | | | | | | |
| **Preferable exposure** | None | | | | | | |

**Course Description:**

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

**Course Educational Objectives:**

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

**List of Activities:**

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

**Instructional Plan:**

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

**References:**

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

**Course Outcomes:**

1. Learn to play Kabaddi
2. Understanding of the fundamental concepts such as rules of play, game variations
3. Understanding of the governing structure and administration of the sport
4. Understand the event management of the sport
5. Apply sport concepts into an active physical lifestyle

**CO-PO Mapping:**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 | PSO4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | | | | | | | | | 3 | 2 | | 3 | | | | |
| CO2 | | | | | | | | | | | | 2 | | | | |
| CO3 | | | | | | | | | | | | 2 | | | | |
| CO4 | | | | | | | 2 | | 3 | 3 | 2 | | | | | |
| CO5 | | | | | | 2 | 2 | | 3 | | | 3 | | | | |

Note: 1 - Low Correlation 2 - Medium Correlation 3 - High Correlation

**APPROVED IN:**

**BOS :19-07-2021** **ACADEMIC COUNCIL:19-07-2021**

**SDG No. & Statement:4**

Good Health and Well-being: Ensure healthy lives and promote well-being for all at all ages.

**SDG Justification:**

The nature of the course facilitates students to engage in various forms of fitness activities and sports-related movements that work on their overall health and wellness. The course focuses on inculcating active living as a lifestyle by making sports fun, engaging and meaningful.

| DOSP1061 | KHO KHO | L | T | P | S | J | C |
|---|---|---|---|---|---|---|---|
| | | 0 | 0 | 0 | 2 | 0 | 2 |
| **Pre-requisite** | None | | | | | | |
| **Co-requisite** | None | | | | | | |
| **Preferable exposure** | None | | | | | | |

**Course Description:**

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

**Course Educational Objectives:**

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

**List of Activities:**

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

**Instructional Plan:**

1. Introduction to Kho Kho - History and development
2. Rules of the Game, Play Area & dimensions
3. Fundamental Skills: Sitting, giving Kho, Pole dive
4. Sports Specific fitness and warmup drills
5. Stances and footwork: Running, sitting
6. Gameplay: Running strategies, ring method, chain method
7. Preparatory Drills and Fun Games

**References:**

1. Khelo India Official Rulebook of Kho Kho

**Course Outcomes:**

1. Learn to play Kho Kho
2. Understanding of the fundamental concepts such as rules of play, game variations
3. Understanding of the governing structure and administration of the sport
4. Understand the event management of the sport
5. Apply sport concepts into an active physical lifestyle

**CO-PO Mapping:**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 | PSO4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | | | | | | | | | 3 | 2 | | 3 | | | | |
| CO2 | | | | | | | | | | | | 2 | | | | |
| CO3 | | | | | | | | | | | | 2 | | | | |
| CO4 | | | | | | | 2 | | 3 | 3 | 2 | | | | | |
| CO5 | | | | | | 2 | 2 | | 3 | | | 3 | | | | |

Note: 1 - Low Correlation 2 - Medium Correlation 3 - High Correlation

**APPROVED IN:**

**BOS :19-07-2021** **ACADEMIC COUNCIL:19-07-2021**

**SDG No. & Statement:4**

Good Health and Well-being: Ensure healthy lives and promote well-being for all at all ages.

**SDG Justification:**

The nature of the course facilitates students to engage in various forms of fitness activities and sports-related movements that work on their overall health and wellness. The course focuses on inculcating active living as a lifestyle by making sports fun, engaging and meaningful.

| DOSP1071 | TABLE TENNIS | L | T | P | S | J | C |
|---|---|---|---|---|---|---|---|
| | | 0 | 0 | 0 | 2 | 0 | 2 |
| **Pre-requisite** | None | | | | | | |
| **Co-requisite** | None | | | | | | |
| **Preferable exposure** | None | | | | | | |

**Course Description:**

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

**Course Educational Objectives:**

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

**List of Activities:**

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

**Instructional Plan:**

1. Introduction to Table Tennis - History and development
2. Rules of the Game, Play Area & dimensions
3. Fundamental Skills - TT: Grips - Racket, ball
4. Stances and footwork
5. TT Gameplay- Forehand, Backhand, Side Spin, High Toss. Strokes-Push, Chop, Drive, Half Volley, Smash, Drop-shot, Balloon, Flick, Loop Drive.
6. Preparatory Drills and Fun Games
7. Game Variations: Singles/ Doubles/ Mixed

**References:**

1. Handbook of the International Table Tennis Federation (ITTF)

**Course Outcomes:**

1. Learn to play Table Tennis
2. Understanding of the fundamental concepts such as rules of play, game variations
3. Understanding of the governing structure and administration of the sport
4. Understand the event management of the sport
5. Apply sport concepts into an active physical lifestyle

**CO-PO Mapping:**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 | PSO4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | | | | | | | | | 3 | 2 | | 3 | | | | |
| CO2 | | | | | | | | | | | | 2 | | | | |
| CO3 | | | | | | | | | | | | 2 | | | | |
| CO4 | | | | | | | 2 | | 3 | 3 | 2 | | | | | |
| CO5 | | | | | | 2 | 2 | | 3 | | | 3 | | | | |

Note: 1 - Low Correlation 2 - Medium Correlation 3 - High Correlation

**APPROVED IN:**

**BOS :19-07-2021** **ACADEMIC COUNCIL:19-07-2021**

**SDG No. & Statement:4**

Good Health and Well-being: Ensure healthy lives and promote well-being for all at all ages.

**SDG Justification:**

The nature of the course facilitates students to engage in various forms of fitness activities and sports-related movements that work on their overall health and wellness. The course focuses on inculcating active living as a lifestyle by making sports fun, engaging and meaningful.

| DOSP1081 | HANDBALL | L | T | P | S | J | C |
|---|---|---|---|---|---|---|---|
| | | 0 | 0 | 0 | 2 | 0 | 2 |
| **Pre-requisite** | None | | | | | | |
| **Co-requisite** | None | | | | | | |
| **Preferable exposure** | None | | | | | | |

**Course Description:**

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

**Course Educational Objectives:**

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

**List of Activities:**

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

**Instructional Plan:**

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

**References:**

1. International Handball Federation - Rules of the Game & Regulations

**Course Outcomes:**

1. Learn to play Handball
2. Understanding of the fundamental concepts such as rules of play, game variations
3. Understanding of the governing structure and administration of the sport
4. Understand the event management of the sport
5. Apply sport concepts into an active physical lifestyle

**CO-PO Mapping:**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 | PSO4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | | | | | | | | | 3 | 2 | | 3 | | | | |
| CO2 | | | | | | | | | | | | 2 | | | | |
| CO3 | | | | | | | | | | | | 2 | | | | |
| CO4 | | | | | | | 2 | | 3 | 3 | 2 | | | | | |
| CO5 | | | | | | 2 | 2 | | 3 | | | 3 | | | | |

Note: 1 - Low Correlation 2 - Medium Correlation 3 - High Correlation

**APPROVED IN:**

**BOS :19-07-2021** **ACADEMIC COUNCIL:19-07-2021**

**SDG No. & Statement:4**

Good Health and Well-being: Ensure healthy lives and promote well-being for all at all ages.

**SDG Justification:**

The nature of the course facilitates students to engage in various forms of fitness activities and sports-related movements that work on their overall health and wellness. The course focuses on inculcating active living as a lifestyle by making sports fun, engaging and meaningful.

| DOSP1091 | BASKETBALL | L | T | P | S | J | C |
|---|---|---|---|---|---|---|---|
| | | 0 | 0 | 0 | 2 | 0 | 2 |
| **Pre-requisite** | None | | | | | | |
| **Co-requisite** | None | | | | | | |
| **Preferable exposure** | None | | | | | | |

**Course Description:**

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

**Course Educational Objectives:**

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

**List of Activities:**

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

**Instructional Plan:**

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

**References:**

1. FIBA Basketball Official Rules

**Course Outcomes:**

1. Learn to play Basketball
2. Understanding of the fundamental concepts such as rules of play, game variations
3. Understanding of the governing structure and administration of the sport
4. Understand the event management of the sport
5. Apply sport concepts into an active physical lifestyle

**CO-PO Mapping:**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 | PSO4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | | | | | | | | | 3 | 2 | | 3 | | | | |
| CO2 | | | | | | | | | | | | 2 | | | | |
| CO3 | | | | | | | | | | | | 2 | | | | |
| CO4 | | | | | | | 2 | | 3 | 3 | 2 | | | | | |
| CO5 | | | | | | 2 | 2 | | 3 | | | 3 | | | | |

Note: 1 - Low Correlation 2 - Medium Correlation 3 - High Correlation

**APPROVED IN:**

**BOS :19-07-2021** **ACADEMIC COUNCIL:19-07-2021**

**SDG No. & Statement:4**

Good Health and Well-being: Ensure healthy lives and promote well-being for all at all ages.

**SDG Justification:**

The nature of the course facilitates students to engage in various forms of fitness activities and sports-related movements that work on their overall health and wellness. The course focuses on inculcating active living as a lifestyle by making sports fun, engaging and meaningful.

| DOSP1101 | TENNIS | L | T | P | S | J | C |
|---|---|---|---|---|---|---|---|
| | | 0 | 0 | 0 | 2 | 0 | 2 |
| **Pre-requisite** | None | | | | | | |
| **Co-requisite** | None | | | | | | |
| **Preferable exposure** | None | | | | | | |

**Course Description:**

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

**Course Educational Objectives:**

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

**List of Activities:**

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

**Instructional Plan:**

1. Introduction to Tennis - History and development
2. Rules of the Game, Play Area & dimensions
3. Fundamental Skills - Tennis: Grips - Racket, ball
4. Stances and footwork
5. Gameplay- Forehand, Backhand, Service, volley, smash
6. Preparatory Drills and Fun Games
7. Game Variations: Singles/ Doubles/ Mixed

**References:**

1. Handbook of the International Tennis Federation (ITF)

**Course Outcomes:**

1. Learn to play Tennis
2. Understanding of the fundamental concepts such as rules of play, game variations
3. Understanding of the governing structure and administration of the sport
4. Understand the event management of the sport
5. Apply sport concepts into an active physical lifestyle

**CO-PO Mapping:**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 | PSO4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | | | | | | | | | 3 | 2 | | 3 | | | | |
| CO2 | | | | | | | | | | | | 2 | | | | |
| CO3 | | | | | | | | | | | | 2 | | | | |
| CO4 | | | | | | | 2 | | 3 | 3 | 2 | | | | | |
| CO5 | | | | | | 2 | 2 | | 3 | | | 3 | | | | |

Note: 1 - Low Correlation 2 - Medium Correlation 3 - High Correlation

**APPROVED IN:**

**BOS :19-07-2021** **ACADEMIC COUNCIL:19-07-2021**

**SDG No. & Statement:4**

Good Health and Well-being: Ensure healthy lives and promote well-being for all at all ages.

**SDG Justification:**

The nature of the course facilitates students to engage in various forms of fitness activities and sports-related movements that work on their overall health and wellness. The course focuses on inculcating active living as a lifestyle by making sports fun, engaging and meaningful.

| DOSP1111 | THROWBALL | L | T | P | S | J | C |
|---|---|---|---|---|---|---|---|
| | | 0 | 0 | 0 | 2 | 0 | 2 |
| **Pre-requisite** | None | | | | | | |
| **Co-requisite** | None | | | | | | |
| **Preferable exposure** | None | | | | | | |

**Course Description:**

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

**Course Educational Objectives:**

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

**List of Activities:**

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

**Instructional Plan:**

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

**References:**

1. World Throwball Federation - Rules of the Game

**Course Outcomes:**

1. Learn to play Throwball
2. Understanding of the fundamental concepts such as rules of play, game variations
3. Understanding of the governing structure and administration of the sport
4. Understand the event management of the sport
5. Apply sport concepts into an active physical lifestyle

**CO-PO Mapping:**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | | | | | | | | | 3 | 2 | | 3 | | | |
| CO2 | | | | | | | | | | | | 2 | | | |
| CO3 | | | | | | | | | | | | 2 | | | |
| CO4 | | | | | | | 2 | | 3 | 3 | 2 | | | | |
| CO5 | | | | | | 2 | 2 | | 3 | | | 3 | | | |

Note: 1 - Low Correlation 2 - Medium Correlation 3 - High Correlation

**APPROVED IN:**

**BOS :19-07-2021** **ACADEMIC COUNCIL:19-07-2021**

**SDG No. & Statement:4**

Good Health and Well-being: Ensure healthy lives and promote well-being for all at all ages.

**SDG Justification:**

The nature of the course facilitates students to engage in various forms of fitness activities and sports-related movements that work on their overall health and wellness. The course focuses on inculcating active living as a lifestyle by making sports fun, engaging and meaningful.

| ENVS1001 | ENVIRONMENTAL STUDIES | L | T | P | S | J | C |
|---|---|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 0 | 0 | 3* |
| **Pre-requisite** | None | | | | | | |
| **Co-requisite** | None | | | | | | |
| **Preferable exposure** | None | | | | | | |

**Course Description:**

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

**Course Educational Objectives:**

- To impart knowledge on natural resources and its associated problems.
- To familiarize learners about ecosystem, biodiversity, and their conservation.
- To introduce learners about environment pollution.
- To acquaint learners on different social issues such as conservation of water, green buildingconcept.
- To make learners understand about the present population scenario, its impacts and role ofinformational technology on environment and human health.
- To make learners understand about the importance of field visit.

**UNIT 1 Multidisciplinary nature of environmental studies & Natural Resources** **10 hours**

Multidisciplinary nature of environmental studies Definition, scope and importance. Need for public awareness. Natural resources and associated problems. Uses and over exploitation of Forest resources, Water resources, Mineral resources, Food resources, Energy resources. Role of an individual in conservation of natural resources.

Activity:

1. Planting tree saplings
2. Identification of water leakage in house and institute-Rectify or report
3. Observing any one day of a week as Car/bike/vehicle free day.

**UNIT 2 Ecosystem and biodiversity 10 hours**

**Ecosystem:** Structure components of ecosystem: Biotic and Abiotic components. Functional components of an ecosystem: Food chains, Food webs, Ecological pyramids, Energy flow in the ecosystem (10% law), Ecological succession.

**Biodiversity:** Definition, Biogeographical classification of India, Values of biodiversity: consumptive use, productive use, social, ethical, aesthetic. Hot-spots of biodiversity. Threats to biodiversity: habitat loss, poaching, man wildlife conflicts. Conservation of biodiversity: In – situ and Ex-situ

Activity:

1. Visit to Zoological Park-Noting different ecosystem
2. Biodiversity register- Flora and fauna in the campus

**UNIT 3 Environmental Pollution 10 hours**

Definition Causes, effects, and control measures of: -Air pollution. Water pollution. Soil pollution. Marine pollution. Noise pollution. Nuclear hazards. Solid waste Management: Causes, effects, and control measures. Role of an individual in prevention of pollution. Pollution case studies.

Activity:

1. Visit to treatment plant and documentation.
2. Documentation of segregation of solid waste-Dry and Wet

**UNIT 4 Social Issues and the Environment 10 hours**

From Unsustainable to Sustainable development Urban problems related to energy. Water conservation, rainwater harvesting, watershed management. Environmental ethics: Issues and possible solutions. Green building concept.

Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case Studies.

Activity:

1. Observing zero hour at individual level-documentation.
2. Eco friendly idols.
3. Rainwater harvesting-creating storage pits in nearby area.

**UNIT 5** **Human Population and the Environment and Environment Protection Act and Field work** **10 hours**

Population growth, variation among nations. Environment and human health. HIV/AIDS, Human rights. Value Education. Women and Child Welfare. Role of Information Technology in Environment and human health. Environment Legislation. Air (Prevention and Control of Pollution) Act. Water (Prevention and Control of Pollution) Act. Wildlife Protection Act. Environmental Protection Act, Issues involved in enforcement of environmental legislation.

Activity:

1. Visit to a local polluted site-industry/agriculture
2. Identifying diseases due to inappropriate environmental conditions

**Text Book(s):**

1. Erach Bharucha. Textbook of environmental studies for undergraduates courses-Universities Press,India Private Limited. 2019.
2. Kaushik A and Kaushik C.P. Perspectives in Environmental Studies. New Age InternationalPublishers Edition-VI. 2018.
3. Dave D Katewa S.S. Textbook of Environmental Studies, 2nd Edition. Cengage Learning India. 2012.

**Additional Reading:**

1. Benny Joseph. Textbook of Environmental Studies 3rd edition, McGraw Hill Publishing company limited. 2017.

**Reference Book(s):**

1. McKinney M.L., Schoch R.M., Yonavjak L. Mincy G. Environmental Science: Systems andSolutions. Jones and Bartlett Publishers. 6th Edition. 2017.
2. Botkin D.B. Environmental Science: Earth as a Living Planet. John Wiley and Sons. 5th edition. 2005.

**Journal(s):**

1. https://www.tandfonline.com/loi/genv20
2. https://library.lclark.edu/envs/corejournals

**Website(s):**

https://www.ugc.ac.in/oldpdf/modelcurriculum/env.pdf From Climate Science to Action | Coursera

**Course Outcomes:**

After the completion of the course student will be able to

1. List different natural resources and their uses
2. Summarize the structure and function of terrestrial and aquatic ecosystems.
3. Identify causes, effects, and control measures of pollution (air, water & soil).
4. Function of green building concept.

5. Adapt value education

**CO-PO Mapping:**

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

Note: 1 - Low Correlation 2 - Medium Correlation 3 - High Correlation

**APPROVED IN: BOS**

**BOS: 04-07-22** **ACADEMIC COUNCIL:14-07-22**

**SDG No. & Statement:**

1.SDG-6-Clean water and Sanitation

2. SDG-7-Affordable and clean energy

3. SDG-13 - Climate change

4. SDG-14 - Life below water

5. SDG-15 - Life on Land

**SDG Justification:**

1. The learner will understand the importance of clean water and sanitation through this course and apply in their daily activities – SDG-6

2. The learner will make use of renewable resources to reduce pollution achieves SDG-7

3. The learner will understand present situation in climate change and takes appropriate steps to combat climate change – SDG-13

4. The learner will understand the existence of life below water – SDG-14

5. The learner will understand to promote sustainable terrestrial ecosystem – SDG15

| FINA3001 | PERSONAL FINANCIAL PLANNING | L | T | P | S | J | C |
|---|---|---|---|---|---|---|---|
| | | 0 | 0 | 2 | 0 | 0 | 1* |
| **Pre-requisite** | None | | | | | | |
| **Co-requisite** | None | | | | | | |
| **Preferable exposure** | Risk Management in Personal financing<br>Fundamentals of Investing<br>Saving Money for the future<br>Personal and Family Financial Planning<br>Introduction to Personal Finance | | | | | | |

**Course Description:**

*Personal Financial Planning is one of the most significant factors in our lives. It is essential that funds are available as and when required at various stages of life. Unavailability of funds at critical stages of our life leads to financial distress and leads to many medical and non- medical problems. There are certain planned and unplanned events in our life. On the one hand,education of our children, their marriage, our retirement etc. are some of the planned events ofour life, but at the same time, some medical urgency, accident or death of an earning member might be some unplanned events. Many of these events are beyond our control, but the availability of funds can be planned to avoid any financial distress. In other words, we cannot stop the rain but can plan for an umbrella.*
*This course looks at the many challenges an individual faces in a complex financial environment and the rising uncertainties of one's life. It focuses on achieving long-term financial comfort of individual and family through goal setting, developing financial and life strategies, acquiring personal financial planning knowledge and managing risk throughout one's life.*

**Course Educational Objectives:**

- To build students' ability to plan for long-term financial comfort of individual andfamily through goal setting, developing financial and life strategies.
- To provide students with knowledge on terms, techniques to evaluate investment avenues.
- To build the skill set of the student to enable them to file their tax returns.

**UNIT 1 Basics of Financial Planning**

Financial Planning Meaning, Need, Objectives, Financial Planning Process, Time Value of Money and its application using excel (NP)

**UNIT 2 Risk and Insurance Management**

Need for insurance, Requirement of insurance interest, Role of insurance in personal finance, Steps in insurance planning, Life and Non-life insurance products, Life insurance needs analysis (NP)

**UNIT 3 Investment Products and Measuring Investment Returns**

**Investment Products:** Small Saving Instruments, Fixed Income Instruments, Alternate Investments, Direct Equity
**Measuring Investment Returns:** Understanding Return and its concept, Compounding concept, Real vs Nominal Rate of Return, Tax Adjusted Return, Risk-Adjusted Return (NP)

**UNIT 4 Retirement Planning**

Introduction to the retirement planning process, estimating retirement corpus, Determining the retirement corpus, Retirement Products (NP)

**UNIT 5 Tax Planning**

**Income Tax:** Income tax principles: Heads of Incomes, Exemptions and Deductions, Types of Assesses, Rates of Taxation, Obligations for Filing and Reporting, Tax aspects of Investment Products, Wealth Tax

**Textbooks:**

1. National Institute of Securities Management (NISM) Module 1 & XA
2. Madhu Sinha, Financial Planning, 2 Edition, McGraw Hill India
3. Simplified Financial Management by Vinay Bhagwat, The Times Group

**References:**

1. Personal Financial Planning (Wealth Management) by S Murali and K R Subbakrishna, Himalaya Publishing House.
2. Mishra K.C., Doss S, (2009). Basics of Personal Financial Planning 1e. NationalInsurance Academy, New Delhi: Cengage Learning.
3. Risk Analysis, Insurance and Retirement Planning by Indian Institute of Banking andFinance.

**Course Outcomes:**

1. Describe the financial planning process and application of time value of money
2. Application of life and non-life insurance products in financial planning
3. Understand the investment avenues and analysis of investment returns
4. Understand the retirement planning and its application
5. Describe and analysis the Tax Planning

**CO-PO Mapping:**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 1 | 0 | 3 | 1 | 1 | 3 |
| CO2 | 2 | 2 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 3 | 1 | 1 | 2 |
| CO3 | 3 | 2 | 1 | 0 | 1 | 0 | 0 | 1 | 0 | 1 | 1 | 3 | 2 | 2 | 3 |
| CO4 | 3 | 2 | 0 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 1 | 2 | 2 | 3 | 2 |
| CO5 | 3 | 3 | 0 | 1 | 1 | 1 | 2 | 1 | 0 | 1 | 1 | 1 | 2 | 2 | 3 |

Note: 1 - Low Correlation 2 - Medium Correlation 3 - High Correlation

**APPROVED IN:**

**BOS : 01-02-2022** **ACADEMIC COUNCIL: 01-04-2022**

**SDG No. & Statement:**

Goal 4: Quality education

Goal 12: Responsible consumption and Production

**SDG Justification:**

Goal 4: This course enables the students to attain their financial literacy that builds in the discipline of saving and improves their lifelong learnings.

Goal 12: This course ensures sustainable consumption and helps in providing them their life long financial requirements .

| LANG1012 | COMMUNICATION SKILLS IN ENGLISH – INTERMEDIATE | L | T | P | S | J | C |
|---|---|---|---|---|---|---|---|
| | | 0 | 0 | 4 | 0 | 0 | 2 |
| **Pre-requisite** | None | | | | | | |
| **Co-requisite** | None | | | | | | |
| **Preferable exposure** | None | | | | | | |

**Course Description**

Communication Skills in English (Intermediate) is the second of the three-level graded courses for the developmental enhancement of communication skills in English. Based on the learning outcomes set in the beginner-level syllabus, this course focuses on giving learners more exposure to the use of language for communicative purposes and equipping them with next level skills (ref. Bloom's taxonomy) and practice in complexity and cognitive engagement. This course also includes the inferential level of comprehension (listening and reading) that involves analysis and application of language skills and decision-making skills while speaking/writing with an awareness of social and personality-based communication variations. This course emphasizesguided writing through adequate pre- and post-context building tasks. The focus is on the stimulation and application of critical thinking in addition to schematic review for communication in real-life situations.

**Course Educational Objectives**

- Train learners to listen to short audio texts with familiar content actively; guided activity like question-making and responding to others' questions based on the audio text would help learners engage in transactional dialogue; extended activities like extrapolating/critiquing the responses would help learners enhance their schematic thinking. (Bloom's Taxonomy Level/s: 2 & 4)
- Equip learners with strategies to read actively and critically and understand the writers' viewpoints and attitude by providing reading comprehension tasks using authentic texts such as op-ed articles from newspapers, and reports on contemporary problems. (Bloom'sTaxonomy Level/s: 4 & 5)
- Help learners understand various aspects and techniques of effective presentations (group/individual) through demonstration and modelling, enabling them to develop their presentation skills by providing training in using the tips and strategies. Learners would be encouraged to observe and express opinion on teacher-modelling. Reflection on issues like anxiety, stage-fear, confidence, and levels of familiarity with topic and audience would be addressed. Practice would be given on tone, pitch, clarity and other speech aspects. Detailed peer feedback and instructor's feedback would cover all the significant aspects. (Bloom's Taxonomy Level/s: 2 & 4)
- Enable learners to become aware of the structure and conventions of academic writing through reading, demonstration, scaffolding activities, and

discussion. Corrective individual feedback would be given to the learners on their writing. (Bloom's Taxonomy Level/s: 2 & 3)

**List of Tasks and Activities**

| S. No. | Tasks | Activities |
|---|---|---|
| 1 | Listening to subject related short discussions/explanations/ speech for comprehension | Pre-reading group discussion, Silent reading (Note-making), Modelling (questioning), Post-reading reflection /Presentation |
| 2 | Asking for information: asking questions related tothe content, context maintaining modalities | Group role-play in a context (i.e. Identifying the situation and different roles and enacting theirroles) |
| 3 | Information transfer: Visual to verbal (unfamiliarcontext); demonstration by teacher, learners' task(guided with scaffolding), learners' task (free), presentation and feedback | Pre-reading game/modelling, discussion in smallgroups, individual writing, and feedback |
| 4 | Introducing officials to peers and vice versa - Formal context | AV support, noticing, individual performance (3-4), pair work (in context), teacher modelling, group work for Introducing self and others in a formal context |
| 5 | Vocabulary in context: Find clues in a text and usethem to guess the meaning of words/phrases. Apply the newly learnt vocabulary in communication (speaking and writing). | Comprehending verbal communication: Identifying the contextual clues in oral and written texts; guessing the meaning of words/phrases in context while reading texts andlistening to discussions/talks |
| 6 | Follow the essentials of lectures, talks, discussions, reports and other forms of academicpresentations and mark individual and group presentations aided with images, audio, video, tabular data, etc. | Making power point presentation aided with images, audio, video, etc. with a small group bylistening to academic lectures/talks/ discussions,etc. |
| 7 | Collaborative work (speaking and writing) in small groups of 3 or 4 learners: discussing a general/discipline-specific topic: creating outline,assigning specific roles to members of the group;and group presentation followed by peer and instructor feedback | Pre-task modelling (peer/teacher), general discussion on structure, group work (collaboration), feedback |
| 8 | Independent reading of different text types using appropriate reference sources by adapting suitable reading styles and speed. Focus on active reading for vocabulary: low-frequency collocations and idiomatic expressions. | Brain-storming, mapping of key terms (content specific), reading and note-making (individual),oral questioning, discussion |

| | | |
|---|---|---|
| 9 | Role-play (specific social and academic situations): planning (making notes), understanding nuances of speaking in context,coordinating with situational clues and fellow speakers/participants | Peer discussion for outline, A-V support, observing (teacher modelling), role play (guided), role-play (free), feedback |
| 10 | Writing a short reflective report of an event - incident/meeting/celebration | Writing a report on meetings/celebrations/events etc. by actively involved in such events and giving a short oral presentation. |
| 11 | Formal Group Discussion on topics of current interest and relevance; focus on effective participation, reflection on control over argument/counter argument, and adherence tothe conventions of formal GD | Noticing strategies from AV modelling, teacher scaffolding thoughopen-house discussion, Note-making(Group work), Group Discussion (free), post-performance discussion,Feedback |
| 12 | Speaking spontaneously on topics of interest and writing short structured essays on the same topicsadopting appropriate academic conventions and grammatical accuracy. Make sure to write accurate paragraph and essay by following: cohesion and coherence, topic sentence, introduction and conclusion | Reading for task preparation, note-making, reflection and corrective peer andteacher feedback. Practice paragraph and essay writing in groups; maintain rubrics of writing |

**Reference Books**


1. P. Kiranmayi Dutt, Geetha Rajeevan. (2007). Basic Communication Skills. FoundationBooks. CUP
2. Harmer, J. (1998). How to teach English. Longman
3. Sanjay Kumar & Pushp Lata. (2018). Communication Skills: A Workbook. OUP.
4. Cambridge IGCSE: English as a Second Language Teacher's Book Fourth Edition.By Peter Lucantoni. CUP (2014).
5. Cambrdige Academic English: An Integrated Skills Course for EAP (Upper Intermediate)By Martin Hewings, CUP (2012)
6. Richards, J.C. and Bohlke, D. (2012). Four Corners-3. Cambridge: CUP.
7. Headway Academic Skills: Reading, Writing, and Study Skills Student's Book, Level-2 bySarah Philpot. OUP
8. Latham-Koenig, C. & Oxenden, C. (2014). American English File. Oxfor: OUP.
9. McCarthy, M. & O' Dell. F. (2016). Academic Vocabulary in Use. Cambridge: CUP


**Online Resources**

1. https://www.grammarly.com/blog/
2. https://www.nationalgeographic.org/education/
3. https://www.bbc.co.uk/teach/skillswise/english/zjg4scw
4. https://www.englishclub.com/
5. https://www.oxfordlearnersdictionaries.com/
6. https://dictionary.cambridge.org/
7. learnenglishteens.britishcouncil.org
8. https://freerice.com/categories/english-vocabulary

9. http://www.5minuteenglish.com/
10. https://breakingnewsenglish.com/
11. https://www.digitalbook.io/
12. https://librivox.org/

**Course Outcomes**

- Understand the speaker's point of view in fairly extended talks on general or discipline-specifictopics, and follow simple lines of argument in discussions on familiar contemporary issues. (Bloom's Taxonomy Level/s: 3)

- "Read and demonstrate understanding of articles and reports on limited range of contemporaryissues in which the writers adopt particular stances. Also provide samples of written communication containing fairly complex information and reasons for choices/opinions/stances. (Bloom's Taxonomy Level/s: 2 & 3)"

- Make short presentations on a limited range of general topics using slides, and engage in small group discussions sharing experiences/views on familiar contemporary issues and give reasons for choices/opinions/plans. (Bloom's Taxonomy Level/s: 3 & 4)

- Write clear, fairly detailed text (a short essay) on a limited range of general topics, and subjects of interest, and communicate clearly through email/letter to seek/pass on information or givereasons for choices/opinions/plans/actions. (Bloom's Taxonomy Level/s: 3)

- Reflect on others' performance, give peer feedback on fellow learners' presentations, responsesto writing tasks and reading comprehension questions. (Bloom's Taxonomy Level/s: 5)

**CO-PO Mapping:**

| | PO 1 | PO 2 | PO3 | PO 4 | PO 5 | PO6 | PO 7 | PO8 | PO 9 | PO 10 | PO 11 | PO 12 | PO 13 | PO 14 | PO 15 | PO 16 | PSO 1 | PSO 2 | PSO3 | PSO4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 3 | 3 | 3 | 3 | 2 | 1 | 1 | 1 | 2 | 1 | 2 | 1 | 1 | 1 | 1 | 2 | 3 | 1 | 1 | 1 |
| **CO2** | 2 | 2 | 2 | 3 | 3 | 2 | 1 | 1 | 2 | 2 | 1 | 1 | 2 | 1 | 1 | 1 | 3 | 2 | 2 | 1 |
| **CO3** | 2 | 3 | 2 | 3 | 3 | 1 | 3 | 2 | 2 | 2 | 2 | 1 | 2 | 1 | 1 | 2 | 3 | 2 | 2 | 1 |
| **CO4** | 2 | 3 | 3 | 3 | 3 | 1 | 2 | 1 | 2 | 2 | 1 | 1 | 2 | 1 | 1 | 1 | 3 | 2 | 1 | 1 |
| **CO5** | 3 | 3 | 2 | 3 | 3 | 1 | 3 | 2 | 1 | 2 | 1 | 2 | 2 | 1 | 1 | 2 | 3 | 1 | 2 | 1 |

Note: 1 - Low Correlation 2 - Medium Correlation 3 - High Correlation

**APPROVED IN:**

**BOS :** **ACADEMIC COUNCIL:**

**SDG No. & Statement:**

SDG 16 Peace and Justice Strong Institutions. Promote peaceful and inclusive societies for sustainable development, provide
access to justice for all and build effective, accountable and inclusive institutions at all levels.

**SDG Justification:** By relating to people with empathy, employing creative problem-solving strategies and engaging meaningfully in a diverse world will create inclusive societies for sustainable development.

| LANG1022 | COMMUNICATION SKILLS IN ENGLISH – ADVANCED | L | T | P | S | J | C |
|---|---|---|---|---|---|---|---|
| | | 0 | 0 | 4 | 0 | 0 | 2 |
| **Pre-requisite** | None | | | | | | |
| **Co-requisite** | None | | | | | | |
| **Preferable exposure** | None | | | | | | |

**Course Description**

Communication Skills in English (Advanced) is the third of the three-level graded courses for the developmental enhancement of communication skills in English. Based on the learning outcomes set in the upper-intermediate syllabus, this course focuses on giving learners exposure to higher levels of skills/input processing (ref. Bloom's taxonomy) and practice in terms of complexity and cognitive engagement. This course includes an advanced level of comprehension i.e. anaytical, evaluative, and extrapolative processing (listening and reading). It involves problem-solving, logical reasoning, and decision-making skills in terms of the application of the learning (speaking/writing) with an awareness of social and personality-based variations in communication. This course provides opportunities for activity-based practice of advanced oraland written communicative skills besides building awareness of the finer nuances of language usefor various purposes. This course emhasizes free writing through meaningfully engaging pre- and post-context-building tasks. There is ample scope for applying critical thinking through simulated activities for effective communication in real-life situations.

**Course Objectives**

1. Enable learners to listen actively, become aware of tone and attitude in speech, and demonstrate their comprehension of fairly complex lines of argument presented by a variety of speakers in talks/presentations/discussions. (Bloom's Taxonomy Level/s: 2 & 4)

2. Enable learners to become aware of tone and attitude in written texts, and demonstrate theircomprehension of fairly complex lines of argument and points of view presented in a variety of texts by equipping them with upper intermediate to advanced level reading skillsand strategies.

3. Make effective presentations, engage in formal group discussions, and write structured essays/ short reports to highlight the significance of actions/decisions/experiences, and sustain views by providing relevant evidence and argument.

4. Equip learners with the skills and strategies to communicate effectively in speech and writing using the language with a degree of fluency, accuracy and spontaneity, and fairly good grammatical control adopting a level of formality appropriate to the context. Encourage learners to apply their knowledge of language and their communication skills in real life situations.

**List of Activities & Tasks for Assessment**

| S.No. | Tasks | Activities | CO |
|---|---|---|---|
| 1 | Evaluative and extrapolative reading of a longtext/short text on a current topic related to technology and society, identifying and questioning the author's intention, post- reading discussion in small groups, maintaining group dynamics, arriving at aconsensus. Understanging and inferring the meaning. | Pre-reading group discussion, silent reading (Note-making), modelling (questioning), post-reading reflectionand brief presentation of thoughts/ideas/opinions on the themeof the text | 3 |
| 2 | Debate in pairs based on listening to two recorded contemporary speeches by well-known leaders in different fields. Peer feedback and instructor feedback. | Pre-recorded audio/video for listening,student checklist for noticing keywords/concepts, pre-task orientation (by teacher), pair work, feedback | 1 |
| 3 | Information transfer: Visual to verbal (unfamiliar context); demonstration by teacher, learners' task (guided with scaffolding), learners' task (free), presentation, question-answer (among students), modification, editing, proofreading,and feedback before the final version is done | Pre-reading game/modelling, discussion in small groups, independent writing and feedback | 4 |
| 4 | Expressing opinion on a short argumentative text (e.g. a journal article or a newspaper editorial) and justifying one's opinion/stance; focus on the use of appropriate conventions offormal and polite speech, and managing bias | Listening to group discussions/debates,reading news-paper articles on current issues and expressing opinions in favour or against the topic (in GDs, debates or writing argumentative essays). | 3 |
| 5 | Collaborative writing in groups of 3 -4 on topics that would require data collection andreading followed by recorded peer-reflectionand peer-feedback, group presentation and feedback | Pre-task modelling (peer), general discussion on structure, group work(collaboration), presentation, peer feedback, Open-class discussion | 5 |
| 6 | Writing a statement of purpose<br>Discuss all details about the student academic and professional background, highlighting the student accomplishments, | Reading & discussion of sample statement of purposes. Discuss the content in groups and know whether all mentioned details are present. Do practice writing after lecture and discussion. | 2 |

| | | | |
|---|---|---|---|
| | goals, and how a student fit to the education applied to. | Make sure to adopt a proper writing style. | |

| | | | |
|---|---|---|---|
| 7 | Mind-mapping for advanced reading, making correlations across texts, extending the author'spoint of view | Reading texts on abstract topics and comprehending the author's perspectiveby inferring the unknown words' meaning in the context and making notes using mind-map strategy and presenting it orally. | 3 |
| 8 | Handling question and answer sessions after presentations: justifying arguments, taking counter-arguments, agreeing and disagreeingwith rationale | Listening to some lectures, talks, and presentations in the academic seminarsand adapting some strategies to handlethe Q&A sessions using polite and formal expressions to agree or disagree with the statements. | 1 |
| 9 | Learn resume and cover letter format & introduce different interview modes. Modelling an interview: with a panel of fourjudges (peers) | Pre-task activity for orientation/strategies (controlled/guided), Model interview (AV support), Group work (role play), Interview in pair (one-to-one), Interview in group (many -to-one), oral corrective feedback (peer/teacher) | 2 |
| 10 | Speaking on abstract and complex topics beyond his/her own area of interest/field ofstudy, using the language flexibly and effectively. | Reading texts on abstract topics and comprehending the author's perspectives. Similarly, listening to talks and discussions on an abstract topic of other discipline and making short oral presentation by sharingviews and opinions. | 3 |
| 11 | Self-reflection on own speech in context(recorded): tone, pitch, relevance, content; extending the reflections/ideas toothers | Listening to selected general discussions (audios and videos) and observing the language production. Recording own speech on some generaltopic and providing a critical review (self-reflection) on it by focusing on the tone, expressions and relevance ofthe content, etc. | 1 |

| | | | |
|---|---|---|---|
| 12 | Collaborative and individual tasks: planning, preparing (preparing an outline, structure, setting objectives, and presenting the plan of action) and executing a mini-project, and submitting a brief report on the same peer and instructor feedback after the planning stage and on completion of the mini project | Pre-task modelling (peer/teacher), general discussion on structure, groupwork (collaboration), oral correction, task distribution, presentation, feedback | 5 |

**Reference Books**


1. Latham-Koenig, C. & Oxenden, C. (2014). American English File-5. Oxford: OUPRichards,
2. J.C. and Bohlke, D. (2012). Four Corners-4. Cambridge: CUP.
3. Cambrdige Academic English: An Integrated Skills Course for EAP (Advanced) By Martin Hewings and Craig Thaine, CUP (2012)
4. Berlin, A. (2016). 50 Conversation Classes: 50 Sets of Conversation Cards With an Accompanying Activity Sheet Containing Vocabulary, Idioms and Grammar. Poland: CreateSpace Independent Publishing Platform
5. Zemach, D. E., Islam, C. (2011). Writing Paragraphs: From Sentence to Paragraph. Germany: Macmillan Education.
6. Stewart, J. P., Fulop, D. (2019). Mastering the Art of Oral Presentations: Winning Orals, Speeches, and Stand-Up Presentations. United Kingdom: Wiley.
7. Kroehnert, Gary. (2010). Basic Presentation Skills. Sidney: McGraw Hill.
8. Cunninghum, S. & Moor, P. (nd). Cutting Edge (Advanced) With Phrase Builder. Longman Publishers. CUP
9. McCarthy, M & O'Dell, F. (2017). English Idioms in Use (Advanced). Cambridge: CUP. Online


**Resources**

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

12. https://librivox.org/

**Course Outcomes**

- Listen to extended lectures, presentations, and discussions on a wide range of contemporary issues and demonstrate understanding of relatively complex lines of argument. (Bloom's Taxonomy Level/s: 2)
- Make presentations using suitable AV aids and engage in formal group discussions on a wide range of topics of contemporary interest, demonstrating awareness of standard/widely accepted conventions. (Bloom's Taxonomy Level/s: 3)
- Read and demonstrate understanding of the writer's stance/viewpoint in articles and reports on a wide range of contemporary issues and discipline-specific subjects. (Bloom's Taxonomy Level/s: 2 & 4)
- Write analytical essays on a wide range of general topics/subjects of interest, and engage in written communication (emails/concise reports) to exchange relatively complex information, giving reasons in support of or against a particular stance/point of view. (Bloom's Taxonomy Level/s: 3 & 4)

- Complete a mini project that necessitates the use of fairly advanced communication skills to accomplish a variety of tasks and submit a report in the given format. (Bloom's Taxonomy Level/s: 4 & 5

| **CO-PO Mapping:** | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **PO 1** | **PO 2** | **PO 3** | **PO 4** | **PO 5** | **PO 6** | **PO 7** | **PO 8** | **PO 9** | **PO 10** | **PO 11** | **PO 12** | **PO 13** | **PO 14** | **PO 15** | **PO 16** | **PSO 1** | **PSO 2** | **PSO 3** | **PSO 4** |
| **CO 1** | 2 | 3 | 2 | 3 | 3 | 1 | 2 | 2 | 2 | 3 | 2 | 2 | 1 | 1 | 1 | 2 | 3 | 3 | 1 | 1 |
| **CO 2** | 2 | 3 | 2 | 3 | 3 | 1 | 3 | 3 | 3 | 3 | 2 | 2 | 2 | 1 | 1 | 2 | 3 | 3 | 1 | 1 |
| **CO 3** | 2 | 3 | 1 | 3 | 3 | 2 | 1 | 1 | 2 | 1 | 2 | 2 | 1 | 1 | 1 | 2 | 3 | 3 | 2 | 1 |
| **CO 4** | 3 | 3 | 3 | 3 | 3 | 2 | 1 | 1 | 3 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 3 | 3 | 2 | 1 |
| **CO 5** | 3 | 3 | 3 | 3 | 3 | 3 | 2 | 2 | 3 | 3 | 2 | 2 | 3 | 1 | 1 | 1 | 3 | 3 | 2 | 1 |
| Note: 1 - Low Correlation 2 - Medium Correlation 3 - High Correlation | | | | | | | | | | | | | | | | | | | | |

**APPROVED IN:**

**BOS :** **ACADEMIC COUNCIL:**

**SDG No. & Statement:**

SDG 16 Peace and Justice Strong Institutions. Promote peaceful and inclusive societies for sustainable development, provide
access to justice for all and build effective, accountable and inclusive institutions at all levels.

**SDG Justification:** By relating to people with empathy, employing creative problem-solving strategies and engaging meaningfully in a diverse world will create inclusive societies for sustainable development.

| MFST1001 | HEALTH & WELLBEING | L | T | P | S | J | C |
|---|---|---|---|---|---|---|---|
| | | 0 | 0 | 2 | 0 | 0 | 1* |
| **Pre-requisite** | None | | | | | | |
| **Co-requisite** | None | | | | | | |
| **Preferable exposure** | None | | | | | | |

**Course Description:**

*The course provides the students a better understanding of the role of a proper diet in maintenance of human health. This course emphasizes the composition of the food, and will help to understand how toexercise, the role of sports and physical fitness in development of a good health. The course also focuses on the importance of emotional well-being and mindfulness. This course helps in teaching the role of yoga in maintenance of physical balance.*

**Course Educational Objectives:**

- To provide an understanding of the relationship between food and nutrition
- To emphasize the role of exercise, sports and physical fitness in obtaining a good health
- To explain about the mindfulness and emotional well being
- To teach the role of yoga and meditation in maintaining the body balance

**UNIT 1**

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

**UNIT 2**

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

**UNIT 3**

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

**UNIT 4**

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

**Course Outcomes:**

By the end of the course, student will

1. Learn the role of nutrition and diet in maintaining a good health
2. understand how the exercise, sports and physical activities will improve health
3. learn mindfulness practices for reducing stress
4. know the importance of yoga and meditation

**APPROVED IN:**

**BOS :01-02-2022** **ACADEMIC COUNCIL: 01-04-2022**

**SDG No. & Statement:**

**SDG Justification:**

| PHPY1001 | GANDHI FOR THE 21ST CENTURY | L | T | P | S | J | C |
|---|---|---|---|---|---|---|---|
| | | 2 | 0 | 0 | 0 | 0 | 2* |
| **Pre-requisite** | None | | | | | | |
| **Co-requisite** | None | | | | | | |
| **Preferable exposure** | None | | | | | | |

**Course Description:**

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

**Course Educational Objectives:**

The objectives of the course are;

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

**UNIT 1 MK Gandhi: Childhood and Education**

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

**UNIT 2 From Mohan to Mahatma-South African Experiences**

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

**UNIT 3 Gandhi and Indian National Movement**

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

**UNIT 4 Gandhi and Sustainable Development**

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

**UNIT 5 Gandhi and Contemporary Issues**

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

**References:**


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


**Course Outcomes:**

After the successful completion of the course the students will be able to;

1. Understand the life of Gandhi
2. Appreciate the role of Gandhian non-violence and Satyagraha in India's freedom struggle.
3. Critically examine the philosophy of Gandhi on Education, Sarvodaya, and Satyagraha
4. Analyse the contemporary significance of Gandhian constructive programmes and eleven vows
5. Examine the possible solutions for some of the contemporary challenges like environmentalissues, moral degradation and ethical dilemmas.

**CO-PO Mapping:**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 2 | 2 | 3 | 3 | 3 | 3 |
| CO2 | 3 | 3 | 2 | 3 | 2 | 3 | 3 | 3 | 3 | 2 | 3 | 2 | 3 | 2 | 3 |
| CO3 | 3 | 3 | 3 | 2 | 3 | 2 | 2 | 3 | 3 | 2 | 2 | 3 | 2 | 3 | 2 |
| CO4 | 3 | 2 | 2 | 3 | 3 | 2 | 2 | 3 | 3 | 2 | 3 | 2 | 3 | 3 | 2 |
| CO5 | 3 | 3 | 2 | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 2 | 2 | 2 | 3 | 3 |

Note: 1 - Low Correlation 2 - Medium Correlation 3 - High Correlation

**APPROVED IN:**

**BOS :01-02-2022** **ACADEMIC COUNCIL: 01-04-2022**

**SDG No. & Statement:**

SDG-4: Ensure Inclusive And Equitable Quality Education And Promote Lifelong Learning Opportunities For All.
Sdg-8: Promote Sustained, Inclusive And Sustainable Economic Growth, Full And Productive Employment And Decent Work For All

**SDG Justification:**

Statement: This course promotes the education for all the people without considering their religion, caste, gender and regional differences.

Statement: This course deals with the basic concepts of national income and employment to understand the national level scenario of how an economy is growing and providing employment.

| POLS1001 | Indian Constitution and History | L | T | P | S | J | C |
|---|---|---|---|---|---|---|---|
| | | 2 | 0 | 0 | 0 | 0 | 2* |
| **Pre-requisite** | None | | | | | | |
| **Co-requisite** | None | | | | | | |
| **Preferable exposure** | None | | | | | | |

**Course Description:**

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

**Course Educational Objectives:**

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

**UNIT 1 India as a Nation 6 hours**

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

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

Brass, P. (2018). 'Continuities and Discontinuities between pre- and post-Independence India', Chapter 1.

*The Politics of Idea since independence*, New Delhi: Cambridge University Press. pp. 1-30.

**UNIT 2 Understanding the Constitution 6 hours**

Mehta, U.S. (2011). 'Constitutionalism' in *The Oxford Companion to Politics in India*, (ed) by Nirja Gopal Jayal, and Pratap Bhanu Mehta, New Delhi: Oxford University Press. pp. 15-27.

Austin, G. (2016), 'The Constituent Assembly: Microcosm in Action' *in The Indian Constitution: Cornerstone of a Nation*, New Delhi: Oxford University Press, pp. 1-25.

Beteille, Andre (2008): "Constitutional Morality," *Economic and Political Weekly*, Vol 43, Issue No 40

Prahladan, Vivek (2012): "Emergence of the Indian Constitution," *Economic and Political Weekly*, Vol 47, Issue No 07.

**UNIT 3 The Preamble, Fundamental Rights and Directive Principles of State Policy** **6 hours**

Bhakshi, P.M. (2011). 'Preamble' in *The Constitution of India*, New Delhi: Universal Law. Pp. 1-5. Laxmikanth, M. (2017). 'Chapter IV: Preamble of the Constitution' in *Indian Polity*, Chennai: McGraw Hills.

Kumar, Virendra (2007): "Basic Structure of The Indian Constitution: Doctrine of Constitutionally Controlled Governance [From Kesavananda Bharati to I.R. Coelho]" *Journal of the Indian Law Institute*, Vol 49, No 3, pp 365-398.

Austin, G (2016), ' ' in *The Indian Constitution: Cornerstone of a Nation*, New Delhi: Oxford University Press, pp.63-105.

Reddy, S (1980). Fundamental Ness of Fundamental Rights and Directive Principles in the Indian Constitution. *Journal of the Indian Law Institute*, 22(3), pp. 399-407.

Bhatia, Gautam (2017): "The Supreme Court's Right to Privacy Judgement," *Economic and Political Weekly*, Vol 52, Issue No 44

**UNIT 4 Citizenship** **6 hours**

Jayal, N.G. (2019). 'Reconfiguring citizenship in contemporary India' in *South Asia Journal of SouthAsian Studies*, pp.33-58.

Roy, Anupama. (2010). 'Chapter I: Enframing the citizen in contemporary times' in *Mapping Citizenship in India*, New Delhi: Oxford University Press.

Das, Veena (2010): "State, Citizenship and the Urban Poor," *Citizenship Studies,* Vol 15, pp 319-333.Valerian Rodrigue

**UNIT 5 Separation and Distribution of Powers** **6 hours**

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

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

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

Kumar, Ashwani (2019): "Constitutional Rights, Judicial Review and Parliamentary Democracy,"

*Economic and Political Weekly*, Vol 51, Issue 15

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

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

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

Agrawal, Pankhuri (2020): "COVID-19 and dwindling Indian Federalism," *Economic and PoliticalWeekly,* Vol 55, Issue No 26

**Recommended Readings:**

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

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

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

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

Subhash C. Kashyap, *Our Constitution*, National Book Trust, New Delhi, 2011.Tillin, Louise. (2015). *Indian Federalism*. New Delhi: Oxford University Press.

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

**Course Outcomes:**

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

1. Demonstrate an understanding of the Constitution of India and how constitutional governance iscarried out in India
2. Interpret knowledge of the Fundamental Rights and Duties of the Citizens as well as theObligation of the state towards its citizens
3. Correlate familiarity with key political developments that have shaped the

Constitution andamended it from time to time.

4. Equip themselves to take up other courses in law after having done a foundation course on IndianConstitution

**CO-PO Mapping:**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 1 | 2 | 1 | 2 | 2 | 3 | 3 | 2 | 3 | 1 | 2 | 1 | 2 | 1 | 2 |
| CO2 | 1 | 1 | 2 | 1 | 2 | 2 | 3 | 2 | 3 | 1 | 2 | 1 | 1 | 2 | 1 |
| CO3 | 1 | 2 | 1 | 2 | 2 | 2 | 3 | 1 | 3 | 1 | 1 | 1 | 2 | 1 | 2 |
| CO4 | 1 | 1 | 1 | 2 | 2 | 2 | 3 | 1 | 3 | 1 | 1 | 1 | 1 | 1 | 2 |
| CO5 | 1 | 1 | 1 | 2 | 2 | 2 | 3 | 2 | 3 | 1 | 2 | 1 | 1 | 1 | 2 |

Note: 1 - Low Correlation 2 - Medium Correlation 3 - High Correlation

**APPROVED IN:**

**BOS :01-02-2022** **ACADEMIC COUNCIL: 01-04-2022**

**SDG No. & Statement:**

SDG-16: Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels.

**SDG Justification:**

The course primarily talks about evolution of the constitutional institutions. Since the SDG-16 talks about the quality of the institutions, it is applicable here.

| VEDC1001 | VENTURE DEVELOPMENT | L | T | P | S | J | C |
|---|---|---|---|---|---|---|---|
| | | 0 | 0 | 0 | 2 | 0 | 2 |
| **Pre-requisite** | None | | | | | | |
| **Co-requisite** | None | | | | | | |
| **Preferable exposure** | None | | | | | | |

**Course Description:**

*India as part of its "Make in India" initiative has been focusing on creating incubation centers within educational institutions, with an aim to generate successful start-ups. These start-ups will become employment creators than employment seekers, which is the need of the hour for our country. This common course (university core) for all the disciplines is a foundation on venture development. It is an experiential course that starts with students discovering their deeper self in terms of how they might contribute to society by creating exciting new products and services that can become the basis of real businesses. The students learn about the emerging areas of knowledge that are the foundations of any successful company. They will learn how to develop insight into the problems and desires of different types of target customers, and from this, to identify the design drivers for a specific innovation. Students will learn specific design methods for new products and services. The students will learn that as important as the product or service itself, is a strategy for monetizing the innovation – for generating revenue, structuring the operating costs, and creating the operating profit needed to support the business, hire new employees, and expand forward. This course is aimed to be the beginning of what might be the most important journey of personal and career discovery so far in a student's life, one with lasting impact. This is not just a course, but potentially, an important milestone in life that a student remembers warmly in the years to come.*

**Course Educational Objectives:**

Students have the opportunity to:

- Discover who they are – Values, Skills, and Contribution to Society
- Understand how creativity works and permeates the innovation process
- Learn the basic processes and frameworks for successful innovation.
- Gain experience in going through the innovation process.
- Conduct field research to test or validate innovation concepts with target customers.

**UNIT 1 PERSONAL DISCOVERY 4 hours**

Personal Values, Excite & Excel, Build a Team, Define Purpose, Mission Statement

**UNIT 2 IDEATION 10 hours**

Ideation & Impact, User Insights - Frameworks, Customer Interviews, Interpreting Results

**UNIT 3 SOLUTION DISCOVERY 8 hours**

Concept Design, Competitive Analysis, Product Line Strategy, Prototyping Solutions, Reality Check

**UNIT 4 BUSINESS MODEL DISCOVERY 4 hours**

Understand the Industry, Types of Business Model, Define Revenue Models, Define Operating Models, Define Customer Journey, Validate Business Model

**UNIT 5 DISCOVERY INTEGRATION**

Define Company Impact, Create Value, Tell Your Story

L – 15; Total Hours – 30

**Textbooks:**

1. Meyer and Lee, “Personal Discovery through Entrepreneurship”, The Institute for Enterprise Growth, LLC. Boston, MA., USA.

**References:**

1. Adi Ignatius (Editor-in-Chief), “Harvard Business Review”, Harvard Business Publishing, Brighton, Massachusetts,2021

**Course Outcomes:**

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

**CO-PO Mapping:**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | | | | | | 3 | 1 | 3 | 3 | 3 | | 3 | | | |
| CO2 | | 3 | | 3 | 1 | 3 | 2 | 1 | 3 | 3 | 1 | 3 | | | |
| CO3 | 1 | 3 | 3 | | 3 | | 3 | | 3 | 1 | 3 | 3 | | | |
| CO4 | | | | | 1 | 1 | 3 | 3 | 3 | 1 | 3 | 1 | | | |
| CO5 | | | | | 3 | 3 | | | 3 | 3 | 3 | 3 | | | |

Note: 1 - Low Correlation 2 - Medium Correlation 3 - High Correlation

**APPROVED IN:**

**BOS :<< date >>** **ACADEMIC COUNCIL: <<date>>**

**SDG No. & Statement:**

4. Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all.

17. Strengthen the means of implementation and revitalize the global partnership for sustainable development.

**SDG Justification:**

4. The course involves identifying one's personal values and working on real-life problems, thus forming the base to work on their passions even past the collegiate life.

17. The course is developed in collaboration with North-eastern University, USA and the training for the champions is being by North-eastern University.

# FACULTY CORE

| MATH1131 | Mathematics-I | L | T | P | S | J | C |
|---|---|---|---|---|---|---|---|
| SDG No.4 | | 4 | 0 | 0 | 0 | 0 | 4 |

**Course Description:**

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

**Course Educational Objectives:**

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

**UNIT 1** **10 hours**

Determinants, properties of determinants, matrices, matrices operations, transpose of a matrix, adjoint of a square matrix, inverse of a matrix, rank of a matrix

**UNIT 2** **10 hours**

Solution of linear system of equations: Cramer's rule, matrix inversion method, Consistency of linear system of equations, Eigen values and Eigen vectors, Cayley-Hamilton theorem (without proof).

**UNIT 3** **10 hours**

**Interpolation:** Operators, Forward and Backward Difference Operations and Their Interrelation. Interpolation Formulae: Newton's Forward, Backward and Divided Difference Formulae, LaGrange's Formula

**UNIT 4** **10 hours**

**Numerical differentiation&Integration:**NumericalDifferentiation:Formulaeforderivatives, **Numerical Integration**: Trapezoidal rule, Simpson's1/3rule,Simpson's3/8rule,Weddle'srule.

**UNIT 5** **10 hours**

**Solution of Algebraic and Transcendental Equations:** Bisection Method, False Position Method, Gauss elimination method, Jacobi's iteration method, Gauss-iedaliterationmethod.

**Textbooks:**

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

**References:**

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

**Course Outcomes:**

On successful completion of this course, students will be able to:

- Able to evaluate various matrices, operations on matrices, linear system of equations using Cramer's rule and Matrix inversion method.
- Evaluate Eigen values and Eigen vectors of a matrix.
- Able to apply forward and backward difference operators to interpolate the function value using Newton's forward and backward formulae, divided difference formula and Lagrange's formula.
- Explain the need of numerical differentiation and numerical integration.
- Able to evaluate numerically the algebraic and transcendental equations

**CO-PO Mapping:**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PSO1 | PSO2 | PSO3 | PSO4 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 3 | 2 | | 1 | | 3 | 3 | 3 | 3 | 3 |
| CO2 | 3 | 3 | 2 | | 1 | | 2 | 3 | 3 | 3 | 3 |
| CO3 | 3 | 3 | 2 | | 1 | | 3 | 3 | 3 | 3 | 3 |
| CO4 | 3 | 3 | 2 | | 1 | | 2 | 3 | 3 | 3 | 3 |
| CO5 | 3 | 3 | 2 | | 1 | | 2 | 3 | 3 | 3 | 3 |

Note: 1 - Low Correlation 2 - Medium Correlation 3 - High Correlation

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|---|---|
| **APPROVED IN:** | |
| **BOS :9.9.2021** | **ACADEMIC COUNCIL: 17.09.2021** |
| | |
| **SDG No. & Statement:** | |
| 4. Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all. | |
| **SDG Justification:** | |
| The topics included in this course are designed to get acquainted with one of the skills that handle necessary mathematical orientation, programming techniques and concept based learning. | |

| MATH1141 | Mathematics-II | L | T | P | S | J | C |
|---|---|---|---|---|---|---|---|
| SDG No.4 | | 4 | 0 | 0 | 0 | 0 | 4 |

**Course Description:**

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

**Course Educational Objectives:**

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

**UNIT 1** **10 hours**

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

**10 hours**

**UNIT 2**

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

**UNIT 3** **10 hours**

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

**UNIT 4** **10 hours**

**Lattices and Boolean algebra:** Ordered, Sets, Hasse Diagrams, Lattices, Distributed Lattices & Complimented Lattices, Boolean algebra, Sum of Products form for Boolean algebra.

**UNIT 5** **10 hours**

**Graph Theory:** Graphs, Multi graphs, directed graphs, Isomorphic Graphs, Paths, Connectivity Complete, Regular and Bipartite Graphs, Planar Graphs, Tree Graphs, Spanning Trees, Kruskal Algorithm, Warshall Algorithm for Path Matrix and Shortest –Path Matrix

**Textbooks:**

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

**References:**

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

**Course Outcomes:**

On successful completion of this course, students will be able to:

1. Describe the basic concepts of sets and operations on sets and different types of relations and representations of relations.
2. Differentiate various functions and explain the concepts of permutations and combinations and Pigeonhole principle.
3. Evaluate logical equivalence formulas using with and without truth tables, and uses logical implication and equivalence formulas in proposition calculus, and outlines the different types of propositional functions & types of quantifiers.
4. Explains the procedure and need of Hasse diagrams in posests, and summarizes different types of lattices and defines the Boolean algebra using lattices.
5. Classify various types of graphs and explains tree graphs with examples and calculates minimum spanning tree of a given connected graph using Kruskal's algorithm and shortest path matrix using Warshall's algorithm.

**CO-PO Mapping:**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PSO1 | PSO2 | PSO3 | PSO4 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 3 | 3 | 2 |
| CO2 | 3 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 3 | 3 | 2 |
| CO3 | 3 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 3 | 3 | 2 |
| CO4 | 3 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 3 | 3 | 2 |
| CO5 | 3 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 3 | 3 | 2 |

Note: 1 - Low Correlation 2 - Medium Correlation 3 - High Correlation

| | |
|---|---|
| **APPROVED IN:** | |
| **BOS :9.9.2021** | **ACADEMIC COUNCIL: 17.09.2021** |
| | |
| **SDG No. & Statement:** | |
| 4. Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all. | |
| **SDG Justification:** | |
| The topics included in this course are designed to get acquainted with one of the skills that handle necessary mathematical orientation, programming techniques and concept based learning. | |

| MATH1291 | Elementary Statistics | L | T | P | S | J | C |
|---|---|---|---|---|---|---|---|
| SDG No. | | 4 | 0 | 0 | 0 | 0 | 4 |

**Course Description:**

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

**Course Educational Objectives:**

To understand the difference between primary and secondary data

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

**UNIT - I**

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

**Learning Outcomes:**

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

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

**UNIT – II**

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

**Learning Outcomes:**

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

- List the difference between arithmetic mean, median and mode.(L1)
- Discuss the basic concepts of measures of central tendency.(L6)
- Discuss the basic concepts of measures of dispersion(L6)

- Evaluate Mean deviation, standard deviation , and variance for ungrouped data.(L5)
- Evaluate Mean deviation, standard deviation , and variance for grouped data.(L5)

**UNIT – III**

**Correlation and Regression :** Types of correlation, Methods of studying Correlation, Karl pearson's coefficient of Correlation, Properties of the coefficient of correlation, Rank correlation coefficient, Uses of regression analysis, Difference between correlation and regression analysis, Regression lines, Regression equations.(10)

**Learning Outcomes**

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

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

**UNIT – IV**

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

**Learning Outcomes**

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

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

**UNIT – V**

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

**Learning Outcomes**

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

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

**Text Book :**

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

**Reference Book :**

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

**Course Outcomes:**

**Upon completion of the course, the student is able to**

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

**CO-PO Mapping:**

| | Programme Objectives | | | | | | | Programme Specific Objectives | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PSO 1** | **PSO 2** | **PSO 3** | **PSO 4** |
| **CO1** | 3 | 2 | 3 | 1 | 2 | 3 | 3 | 1 | 3 | 2 | 3 |
| **CO2** | 3 | 3 | 2 | 1 | 2 | 2 | 3 | 2 | 3 | 3 | 2 |
| **CO3** | 3 | 2 | 2 | 1 | 2 | 2 | 2 | 2 | 3 | 2 | 1 |
| **CO4** | 3 | 2 | 1 | 2 | 2 | 2 | 3 | 2 | 3 | 1 | 2 |
| **CO5** | 3 | 1 | 2 | 1 | 2 | 2 | 2 | 1 | 3 | 2 | 1 |

Note: 1 - Low Correlation 2 - Medium Correlation 3 - High Correlation

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|---|---|
| **APPROVED IN:** | |
| **BOS :9.9.2021** | **ACADEMIC COUNCIL: 17.09.2021** |
| | |
| **SDG No. & Statement:** | |
| 4. Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all. | |
| **SDG Justification:** | |
| The topics included in this course are designed to get acquainted with one of the skills that handle necessary mathematical orientation, programming techniques and concept based learning. | |

# PROGRAMME CORE

| CSCI1041 | Python Programming Lab | L | T | P | S | J | C |
|---|---|---|---|---|---|---|---|
| SDG No.4 | | 0 | 0 | 2 | 0 | 0 | 1 |

**Course Description:**

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

**Course Educational Objectives:**

- To learn writing, testing and debugging python programs using interpreter
- To practice use of programming constructs of python
- To practice python data structures and their applications
- To get familiar with Built-in and user defined functions.
- To understand the concept of Files.

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

j. Replace elements
k. Join two lists
l. Membership test
m. Nested lists

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

**References:**

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

**Course Outcomes:**

Upon completion of the course, the student is able to

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

**CO-PO Mapping:**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PSO1 | PSO2 | PSO3 | PSO4 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 1 | 1 | 1 | 1 | 1 | 2 | 3 | 1 | 2 | 2 |
| CO2 | 2 | 1 | 2 | 1 | 1 | 1 | 2 | 2 | 1 | 2 | 1 |
| CO3 | 2 | 2 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 2 | 1 |
| CO4 | 2 | 2 | 2 | 1 | 1 | 1 | 3 | 1 | 2 | 2 | 2 |
| CO5 | 2 | 1 | 1 | 1 | 1 | 1 | 2 | 3 | 1 | 2 | 2 |

Note: 1 - Low Correlation 2 - Medium Correlation 3 - High Correlation

| **APPROVED IN:** | |
|---|---|
| **BOS :9.9.2021** | **ACADEMIC COUNCIL: 17.09.2021** |
| | |
| **SDG No. & Statement:** | |
| 4. Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all. | |
| **SDG Justification:** | |
| The topics included in this course are designed to get acquainted with one of the skills that handle necessary mathematical orientation, programming techniques and concept based learning. | |

| CSCI1051 | Problem Solving and Programming with Python | L | T | P | S | J | C |
|---|---|---|---|---|---|---|---|
| SDG No.4 | | 4 | 0 | 0 | 0 | 0 | 4 |

**Course Description:**

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

**Course Educational Objectives:**

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

**UNIT 1** **8 hours**

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

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

**UNIT 2** **8 hours**

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

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

**UNIT 3** **8 hours**

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

**UNIT 4** **8 hours**

**Data Structures:** Lists, Quick Introduction to Objects and Classes, Tuple, Dictionary,

Sequence, Set, Working with Strings.

**UNIT 5** **8 hours**

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

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

**Textbooks:**

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

**References:**

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

**Course Outcomes:**

Upon completion of the course, the student is able to

- Build knowledge about basic Python language syntax and semantics.(L5)
- Analyze programming skills in core python.(L4)
- What python programs and use concepts such as variables, conditional and iterative execution methods.(L1)
- Build the knowledge on usage of Data structures in Python (L5)
- Usage of modules and Built-in functions

**CO-PO Mapping:**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PSO1 | PSO2 | PSO3 | PSO4 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | 1 | 1 | 1 | 1 | 1 | 2 | 3 | 1 | 2 | 2 |
| CO2 | 3 | 1 | 2 | 1 | 1 | 1 | 3 | 3 | 1 | 3 | 3 |
| CO3 | 2 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 1 | 2 | 2 |
| CO4 | 2 | 2 | 2 | 1 | 1 | 1 | 2 | 2 | 1 | 3 | 3 |
| CO5 | 2 | 2 | 2 | 1 | 1 | 1 | 2 | 2 | 1 | 3 | 3 |

Note: 1 - Low Correlation 2 - Medium Correlation 3 - High Correlation

| | |
|---|---|
| **APPROVED IN:** | |
| **BOS :9.9.2021** | **ACADEMIC COUNCIL: 17.09.2021** |
| | |
| **SDG No. & Statement:** | |
| 4. Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all. | |
| **SDG Justification:** | |
| The topics included in this course are designed to get acquainted with one of the skills that handle necessary mathematical orientation, programming techniques and concept based learning. | |

| CSCI1061 | Introduction to Information Technology | L | T | P | S | J | C |
|---|---|---|---|---|---|---|---|
| SDG No.4 | | 4 | 0 | 0 | 0 | 0 | 4 |

**Course Description:**

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

**Course Educational Objectives:**

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

**UNIT 1** **8 hours**

**Data and Information:** Introduction, Types of data, Simple model of a computer, Data processing using a computer, Desktop computer.

**Acquisition of Numbers and Textual Data:** Introduction, input units, internal representation of numeric data, Representation of characters in computers, Error Detecting codes.

**Processing and Displaying Textual Data:** Word processor, Desktop Publishing, Page Description language, Mark-up Languages.

**UNIT 2** **8 hours**

**Data storage:** Introduction, Storage cell, Physical devices used as storage cells, Random access memory, Read only memory, Secondary storage, Compact disk read only memory (CDROM), Archival store.

**Central Processing Unit:** Introduction, Structure of a central processing unit, Specifications of a CPU, Interconnection of CPU with memory and I/O units, Embedded processors.

**Output Devices:** Video Display Devices, Touch Screen, Printers, Audio Output.

**UNIT 3** **8 hours**

**Computer Networks:** Introduction, Local Area Network (LAN), Applications of LAN, Wide Area Network (WAN), Internet, Naming computers connected to Internet, Future of Internet Technology.

**Computer Software:** Introduction, Operating system, Programming languages, Classification of programming languages, Classification of Programming Languages based on applications.

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

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

**UNIT 4** **8 hours**

Data organization: Introduction, Organizing a database, Structure of a database, Database Management System, Example of database design, Non-text databases, Archiving databases. Processing Numerical Data: Introduction, Use of spreadsheets, Numerical computation examples.Business Information Systems: Introduction, Types of Information Needed by Organization.

**UNIT 5** **8 hours**

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

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

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

**Textbooks:**

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

**References:**

2. Computing Fundamentals by Peter Norton, Tata Mc. Graw Hill, 6th edition,2006.
3. Fundamentals of Computers by E.Balagurusamy, Tata McGraw Hill,2009.

**Course Outcomes:**

Upon completion of the course, the student is able to

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

**CO-PO Mapping:**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PSO1 | PSO2 | PSO3 | PSO4 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 3 | 2 | 3 | 3 | 2 | 3 | 2 | 3 | 2 | 3 |
| CO2 | 3 | 2 | 2 | 2 | 2 | 1 | 2 | 2 | 3 | 2 | 1 |
| CO3 | 3 | 2 | 3 | 2 | 2 | 3 | 3 | 2 | 3 | 3 | 2 |
| CO4 | 3 | 3 | 2 | 2 | 2 | 2 | 3 | 2 | 2 | 2 | 3 |
| CO5 | 3 | 3 | 3 | 3 | 2 | 2 | 3 | 2 | 2 | 3 | 3 |

Note: 1 - Low Correlation 2 - Medium Correlation 3 - High Correlation

| **APPROVED IN:** | |
|---|---|
| **BOS :9.9.2021** | **ACADEMIC COUNCIL: 17.09.2021** |
| | |
| **SDG No. & Statement:** | |
| 4. Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all. | |
| **SDG Justification:** | |
| The topics included in this course are designed to get acquainted with one of the skills that handle necessary mathematical orientation, programming techniques and concept based learning. | |

| CSCI1071 | Data Analysis Lab | L | T | P | S | J | C |
|---|---|---|---|---|---|---|---|
| SDG No.4 | | 0 | 0 | 2 | 0 | 0 | 1 |

**Course Description:**

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

**Course Educational Objectives:**

- the Excel user interface, the basic terminology of Excel
- Gets the skill of working with formulas and functions
- Uses font formatting, borders, alignment, number formatting, and Excel styles and themes
- Optimizes a spreadsheet for printing by managing margins, orientation, headers and footers, and more
- Creates and edits charts in Excel.

**Data Analysis using Excel**

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

**References:**

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

**Course Outcomes:**

Upon completion of the course, the student is able to

- Uses font formatting, borders, alignment, number formatting, and Excel styles and themes
- Understanding to manage margins, orientation, headers and footers
- Understand how to use the Excel spreadsheet for data analytics.
- Implement and use the functions and formulas in the Excel.
- Understand the usage of various graphs.

**CO-PO Mapping:**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PSO1 | PSO2 | PSO3 | PSO4 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 2 | 1 | 1 | 3 | 1 | 3 | 1 | 1 | 1 | 1 |
| CO2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| CO3 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| CO4 | 3 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| CO5 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |

Note: 1 - Low Correlation 2 - Medium Correlation 3 - High Correlation

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| **APPROVED IN:** | |
| **BOS :9.9.2021** | **ACADEMIC COUNCIL: 17.09.2021** |
| | |
| **SDG No. & Statement:** | |
| 4. Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all. | |
| **SDG Justification:** | |
| The topics included in this course are designed to get acquainted with one of the skills that handle necessary mathematical orientation, programming techniques and concept based learning. | |

| CSCI1131 | Fundamentals of Digital Logic Circuits | L | T | P | S | J | C |
|---|---|---|---|---|---|---|---|
| SDG No.4 | | 4 | 0 | 0 | 0 | 0 | 4 |

**Course Description:**

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

**Course Educational Objectives:**

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

**UNIT 1** **8 hours**

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

**UNIT 2** **8 hours**

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

**UNIT 3** **8 hours**

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

**UNIT 4** **8 hours**

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

**UNIT 5** **8 hours**

**Synchronous Sequential Circuits:** Sequential Circuits, Latches, Flip-Flops, Analysis of Clocked Sequential Circuits, State reduction and Assignment, Design procedure.
Registers and Counters: Registers, Shift registers, Ripple Counters.

**Textbooks:**

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

**References:**

2. Fundamentals of Digital Logic Design by Stephen Brown and ZvonkoVranesic, McGraw Hill Education, 3rd edition, 2009.

**Course Outcomes:**

Upon completion of the course, the student is able to

- To examine Binary systems and Number conversions.(L4)
- To discuss about the Boolean algebra, logic gates and its operations (L6)
- To understand the functionality of the combinational circuits (L2)
- To construct the various combinational circuits as per the required logic (L6)
- To understand the functionality of sequential circuits (L2)

**CO-PO Mapping:**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PSO1 | PSO2 | PSO3 | PSO4 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 1 | 2 | 1 | 1 | 1 | 1 | 2 | 3 | 2 | 2 | 2 |
| CO2 | 1 | 2 | 1 | 2 | 1 | 1 | 2 | 3 | 2 | 2 | 2 |
| CO3 | 1 | 2 | 1 | 2 | 1 | 1 | 2 | 3 | 2 | 2 | 2 |
| CO4 | 1 | 2 | 1 | 1 | 1 | 2 | 2 | 3 | 2 | 1 | 2 |
| CO5 | 1 | 2 | 1 | 1 | 1 | 2 | 2 | 3 | 2 | 1 | 2 |

Note: 1 - Low Correlation 2 - Medium Correlation 3 - High Correlation

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| **APPROVED IN:** | |
| **BOS :9.9.2021** | **ACADEMIC COUNCIL: 17.09.2021** |
| | |
| **SDG No. & Statement:** | |
| 4. Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all. | |
| **SDG Justification:** | |
| The topics included in this course are designed to get acquainted with one of the skills that handle necessary mathematical orientation, programming techniques and concept based learning. | |

| CSCI1081 | Introduction to Operating Systems | L | T | P | S | J | C |
|---|---|---|---|---|---|---|---|
| SDG No.4 | | 4 | 0 | 0 | 0 | 0 | 4 |

**Course Description:**

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

**Course Educational Objectives:**

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

**UNIT 1** **8 hours**

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

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

**UNIT 2** **8 hours**

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

**Process Scheduling:** Basic concepts, Scheduling criteria, Scheduling algorithms.

**UNIT 3** **8 hours**

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

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

**UNIT 4** **8 hours**

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

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

**UNIT 5** **8 hours**

**File System:** File concept, Access Methods, Directory and Disk Structure, File-System Mounting, File Sharing.

**Textbooks:**

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

**References:**

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

**Course Outcomes:**

Upon completion of the course, the student is able to

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

**CO-PO Mapping:**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PSO1 | PSO2 | PSO3 | PSO4 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | 2 | 2 | 1 | 1 | 1 | 2 | 2 | 1 | 2 | 2 |
| CO2 | 3 | 1 | 2 | 1 | 2 | 1 | 2 | 3 | 2 | 3 | 2 |
| CO3 | 1 | 2 | 2 | 1 | 1 | 1 | 2 | 1 | 1 | 2 | 2 |
| CO4 | 3 | 2 | 2 | 1 | 1 | 1 | 2 | 1 | 1 | 2 | 3 |
| CO5 | 2 | 2 | 2 | 1 | 1 | 1 | 2 | 2 | 1 | 2 | 3 |

Note: 1 - Low Correlation 2 - Medium Correlation 3 - High Correlation

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| **APPROVED IN:** | |
| **BOS :9.9.2021** | **ACADEMIC COUNCIL: 17.09.2021** |
| | |
| **SDG No. & Statement:** | |
| 4. Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all. | |
| **SDG Justification:** | |
| The topics included in this course are designed to get acquainted with one of the skills that handle necessary mathematical orientation, programming techniques and concept based learning. | |

| CSCI1091 | Web Technologies | L | T | P | S | J | C |
|---|---|---|---|---|---|---|---|
| SDG No.4 | | 4 | 0 | 0 | 0 | 0 | 4 |

**Course Description:**

*Web Technologies helps to learn about the HTTP communication protocol. The markup language like HTML, which helps in formatting and transforming web content, interactive graphics, and multimedia content on the web. It helps to know client-side Programming by using JavaScript.*

**Course Educational Objectives:**

- To understand the various elements of HTML and Linking of Documents(L1)
- To design web applications using style sheets(L6)
- To design static webpage using Markup languages(L6)
- To develop web applications by making use of JavaScript. (L3)
- To know about JSS(DOM) and adding dynamic content to web applications(L6)

**UNIT 1** **8 hours**

**Internet Basics:** Basic Concepts, Communicating on the Internet, Internet Domains, Internet Server Identities, Establishing Connectivity on the Internet, Client IP address, Transmission Control Protocols.

**Introduction to HTML:** Information files creation, Web Server, Web Client/Browser, Hyper Text Markup Language, Commonly used HTML Commands.

**LISTS:** Types of lists.

**UNIT 2** **8 hours**

**Adding Graphics to HTML Documents:** Using the Attributes- Border, Width, and Height, Align and Alt Attributes.

**Tables:** Introduction, The Caption Tag, Using the width and boarder, Cell padding, Cell spacing, Using Background-Color property, Using the Colspan and Rowspan Attributes.

**Linking Documents:** Links, Images as Hyperlinks. FRAMES: Introduction to Frames.

**UNIT 3** **8 hours**

**CSS2 -** Introduction, Syntax, Selectors, Color Background Cursor, Text Fonts, Lists Tables, Box Model, Display Positioning, Floats.

**Dynamic HTML:** Cascading Style Sheets, Class, Using the TAG, External Style Sheets, Using the TAG.

**UNIT 4** **8 hours**

**Introduction To JavaScript:** JavaScript in web pages, The Advantages of JavaScript, Writing JavaScript into HTML, Basic Programming Techniques, Operators and Expressions in JavaScript, JavaScript Programming Constructs, Conditional Checking, Super controlled-endless loops, Functions in JavaScript, User defined functions, Placing text in a Browser, Dialog Boxes.

**UNIT 5** **8 hours**

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

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

**Textbooks:**

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

**References:**

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

**CourseOutcomes:**

**Upon completion of the course, the student is able to**

- Analyze a web page and identify its elements and attributes. (L4)
- To apply graphics to web pages, to know about tables and list and frames. (L3)
- Create web pages using Cascading Style Sheets. (L6)
- Understand the concept of Java Scripts. (L2)
- Build dynamic web pages using JavaScript (Client-side programming). (L6)

**CO-PO Mapping:**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PSO1 | PSO2 | PSO3 | PSO4 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 2 | 2 | 1 | 1 | 1 | 2 | 3 | 2 | 3 | 2 |
| CO2 | 3 | 2 | 2 | 1 | 1 | 1 | 2 | 3 | 2 | 3 | 2 |
| CO3 | 3 | 2 | 2 | 1 | 1 | 1 | 2 | 3 | 2 | 3 | 2 |
| CO4 | 3 | 2 | 2 | 1 | 1 | 1 | 2 | 3 | 2 | 3 | 2 |
| CO5 | 3 | 2 | 2 | 1 | 1 | 1 | 2 | 3 | 2 | 3 | 2 |

Note: 1 - Low Correlation 2 - Medium Correlation 3 - High Correlation

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| **APPROVED IN:** | |
| **BOS :9.9.2021** | **ACADEMIC COUNCIL: 17.09.2021** |
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| **SDG No. & Statement:** | |
| 4. Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all. | |
| **SDG Justification:** | |
| The topics included in this course are designed to get acquainted with one of the skills that handle necessary mathematical orientation, programming techniques and concept based learning. | |

| CSCI1101 | Web Technologies Lab | L | T | P | S | J | C |
|---|---|---|---|---|---|---|---|
| SDG No.4 | | 0 | 0 | 2 | 0 | 0 | 1 |

**Course Description:**

*Web Technologies helps to learn about the HTTP communication protocol. The markup language like HTML, which helps in formatting and transforming web content, interactive graphics, and multimedia content on the web. It helps to know client-side Programming by using JavaScript.*

**Course Educational Objectives:**

- To understand the various elements of HTML and Linking of Documents(L1)
- To design web applications using style sheets(L6)
- To design static webpage using Markup languages(L6)
- To develop web applications by making use of JavaScript. (L3)
- To know about JSS(DOM) and adding dynamic content to web applications(L6)

**List of Experiments**

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

13. Write a JavaScript to demonstrate built-in functions.
14. Write a JavaScript to create login application using form elements.

**References:**


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


**Course Outcomes:**

**Upon completion of the course, the student is able to**

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

**CO-PO Mapping:**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PSO1 | PSO2 | PSO3 | PSO4 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 3 | 2 | 2 | 2 | 1 | 2 | 3 | 3 | 2 | 2 |
| CO2 | 3 | 3 | 2 | 2 | 2 | 1 | 2 | 3 | 3 | 2 | 2 |
| CO3 | 3 | 3 | 2 | 2 | 2 | 1 | 2 | 3 | 3 | 2 | 2 |
| CO4 | 3 | 3 | 2 | 2 | 2 | 1 | 2 | 3 | 3 | 2 | 2 |
| CO5 | 3 | 3 | 2 | 2 | 2 | 1 | 2 | 3 | 3 | 2 | 2 |

Note: 1 - Low Correlation 2 - Medium Correlation 3 - High Correlation

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| **APPROVED IN:** | |
| **BOS :9.9.2021** | **ACADEMIC COUNCIL: 17.09.2021** |
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| **SDG No. & Statement:** | |
| 4. Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all. | |
| **SDG Justification:** | |
| The topics included in this course are designed to get acquainted with one of the skills that handle necessary mathematical orientation, programming techniques and concept based learning. | |

| CSCI1111 | Introduction to Object Oriented Programming with C++ | L | T | P | S | J | C |
|---|---|---|---|---|---|---|---|
| SDG No.4 | | 4 | 0 | 0 | 0 | 0 | 4 |

**Course Description:**

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

**Course Educational Objectives:**

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

**UNIT 1** **8 hours**

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

**UNIT 2** **8 hours**

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

**UNIT 3** **8 hours**

**Constructor:** Constructor Parameterized Constructor, Multiple Constructors in a Class, Copy Constructor, Dynamic Constructors, Destructors. Operator Overloading: Definition, Overloading Unary, Binary operators, Overloading Binary Operators using Friends,

Manipulation of Strings using operators.

**UNIT 4** **8 hours**

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

**UNIT 5** **8 hours**

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

**Textbooks:**

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

**References:**

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

**Course Outcomes:**

**Upon completion of the course, the student is able to**

- Demonstrate of classes and objects.
- Discuss the concepts of inheritance and polymorphism.
- Develop constructors and destructors, friend function.
- Discuss overloading of operators in C++.
- Distinguish function overloading and function overriding.

**CO-PO Mapping:**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PSO1 | PSO2 | PSO3 | PSO4 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| CO2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| CO3 | 3 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| CO4 | 3 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| CO5 | 3 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |

Note: 1 - Low Correlation 2 - Medium Correlation 3 - High Correlation

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| **APPROVED IN:** | |
| **BOS :9.9.2021** | **ACADEMIC COUNCIL: 17.09.2021** |
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| **SDG No. & Statement:** | |
| 4. Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all. | |
| **SDG Justification:** | |
| The topics included in this course are designed to get acquainted with one of the skills that handle necessary mathematical orientation, programming techniques and concept based learning. | |

| CSCI1121 | Programming with C++ Lab | L | T | P | S | J | C |
|---|---|---|---|---|---|---|---|
| SDG No.4 | | 0 | 0 | 2 | 0 | 0 | 1 |

**Course Description:**

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

**Course Educational Objectives:**

- It provide the necessary knowledge to design and develop programs using Object Oriented Programming Concepts .
- Students will learn how to write programs using matrixes ,Constructors .
- Students will learn how to write programs using inheritance, Polymorphism.
- Students will learn how to write programs using inheritance, Polymorphism.
- Students also learn how to write programs using Exception Handling .

**List of Experiments**

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

14. Write a program to demonstrate the usage of virtual functions.
15. Write a program to find average marks of the subjects of a student. Throw multiple exceptions and define multiple catch statements to handle division by zero as well as array index out of bounds exceptions.

**References:**


1. Object Oriented Programming in C++ by E. Balaguruswamy, 4rd Edition, Tata McGraw Hill Publication.
2. Let Us C++ by YashavantP.Kanetkar,2ndEdition, BPB Publications,


**Course Outcomes:**

Upon completion of the course, the student is able to

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

**CO-PO Mapping:**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PSO1 | PSO2 | PSO3 | PSO4 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| CO2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| CO3 | 3 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| CO4 | 3 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| CO5 | 3 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |

Note: 1 - Low Correlation 2 - Medium Correlation 3 - High Correlation

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| **APPROVED IN:** | |
| **BOS :** | **ACADEMIC COUNCIL:** |
| | |
| **SDG No. & Statement:** | |
| 4. Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all. | |
| **SDG Justification:** | |
| The topics included in this course are designed to get acquainted with one of the skills that handle necessary mathematical orientation, programming techniques and concept based learning. | |

| CSCI2001 | Elementary Data Structures | L | T | P | S | J | C |
|---|---|---|---|---|---|---|---|
| SDG No.4 | Using C++ | 4 | 0 | 0 | 0 | 0 | 4 |

## Course Objectives:

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

## UNIT 1

**Fundamental Concepts:** Introduction to Data Structures, Types of Data Structures, and Implementation of data structures, Analysis of Algorithms.
**Complexity of algorithms:** Space complexity, Time complexity.
**Linear Data Structure Using Arrays:** Sequential Organization, Linear Data Structure.
**Sequential Organization:** Arrays, Array as an Abstract Data Type, Memory Representation and Address Calculation, The Class Array, Inserting an element into an array, Deleting an element, Pros and Cons of Arrays, Applications of arrays, Sparse Matrix. (7)

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

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

## UNIT 2

**Stacks**: Primitive operations, Stack Abstract Data Type, Representation of Stacks Using Sequential Organization (Arrays), Applications of Stack, Expression Evaluation and Conversion Polish notation and expression.
**Queues**: Concept of Queues, Queue as Abstract Data Type, Realization of Queues Using Arrays, Circular Queue, Advantages of using circular queues, Array implementation of priority queue. (12)

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

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

## UNIT 3

**Linked Lists:** Introduction, Linked List, Comparison of sequential and linked organizations, Linked list terminology, Primitive operations, Realization of Linked Lists using arrays, Linked list using dynamic memory management.
**Linked List Abstract Data Type:** Data structure of node, Insertion of a node, Linked list traversal, Deletion of a node, Types of linked list, Linear and Circular linked lists, Linked Stack, Linked Queues**.**

**Learning Outcomes:** (10)

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

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

## UNIT 4

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

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

**Learning Outcomes:**

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

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

## UNIT 5

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

**Searching:** Search Techniques, Sequential Search, Binary search.

**Sorting:** Types of sorting, general sort concepts, Bubble sort, Insertion sort, Selection sort Quick sort**.** (8)

**Learning Outcomes:**

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

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

## Text Book:

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

## Reference Books:

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

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

## Course Outcomes:

**Upon completion of the course, the student is able to**

- Develop knowledge of basic data structures for storage and retrieval of ordered or unordereddata. Data structures include: arrays, linked lists, binary trees, heaps, and hash tables. (L6)
- Develop knowledge of applications of data structures including the ability to implement algorithms for the creation, insertion, deletion, searching, and sorting of each data structure.(L6)
- Analyze and compare algorithms for efficiency using C++.(L4)

- Developing Knowledge of applications involving tree and graphs
- How to implement projects requiring the implementation of the above data structures using C++.(L1)

**CO-PO Mapping:**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PSO1 | PSO2 | PSO3 | PSO4 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| CO2 | 2 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 1 |
| CO3 | 3 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 2 | 1 |
| CO4 | 3 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| CO5 | 3 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |

Note: 1 - Low Correlation 2 - Medium Correlation 3 - High Correlation

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|---|---|
| **APPROVED IN:** | |
| **BOS :9.9.2021** | **ACADEMIC COUNCIL: 17.09.2021** |
| | |
| **SDG No. & Statement:** | |
| 4. Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all. | |
| **SDG Justification:** | |
| The topics included in this course are designed to get acquainted with one of the skills that handle necessary mathematical orientation, programming techniques and concept based learning. | |

| CSCI2021 | Introduction to Unix Programming | L | T | P | S | J | C |
|---|---|---|---|---|---|---|---|
| SDG No.4 | | 4 | 0 | 0 | 0 | 0 | 4 |

**Course Description:**

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

**Course Educational Objectives:**

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

**UNIT 1** **8 hours**

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

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

**UNIT 2** **8 hours**

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

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

**UNIT 3** **8 hours**

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

**UNIT 4** **8 hours**

The vi Editor: vi Basics-Input Mode-Entering and Replacing Text-Saving Test and quitting-Editing Text. The Shell: The shell's Interpretive Cycle-Shell Offerings-Pattern Matching-The wild-cardsEscaping and Quoting-Redirection-Pipes-tee-Command substitution-Shell Variables. The Shell: The shell's Interpretive Cycle-Shell Offerigs, Pattern Matching-The Wild-cardsEscaping and Quoting-Redirection-Pipes-tee-Command Substitution-Shell variables. More file attributes: file systems and Inodes-Hrd links-Symbolic Links and ln-The Directory-find. 33 Simple Filters: head, tail, cut, paste, sort, uniq ,tr. Filter using regular expressions: grep-sed.

**UNIT 5** **8 hours**

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

**Textbooks:**

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

**References:**

2. UNIX Concepts and Programming by MuruganSethuraman, Denet and Company,2006.

**Course Outcomes:**

Upon completion of the course, the student is able to

- Learn the concepts, design, structure, features of the UNIX operating system.
- Learn the basic UNIX Utilities.
- Learn the shell script commands.
- Learn vi Editor and its commands
- Learn and write UNIX shell script programming.

**CO-PO Mapping:**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PSO1 | PSO2 | PSO3 | PSO4 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 3 |
| CO2 | 1 | 2 | 3 | 2 | 3 | 1 | 3 | 1 | 2 | 3 | 1 |
| CO3 | 1 | 2 | 3 | 1 | 3 | 1 | 3 | 2 | 3 | 1 | 2 |
| CO4 | 1 | 2 | 3 | 1 | 3 | 1 | 3 | 2 | 3 | 1 | 2 |
| CO5 | 1 | 2 | 3 | 2 | 3 | 1 | 3 | 2 | 2 | 1 | 2 |

Note: 1 - Low Correlation 2 - Medium Correlation 3 - High Correlation

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|---|---|
| **APPROVED IN:** | |
| **BOS :** | **ACADEMIC COUNCIL:** |
| | |
| **SDG No. & Statement:** | |
| 4. Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all. | |
| **SDG Justification:** | |
| The topics included in this course are designed to get acquainted with one of the skills that handle necessary mathematical orientation, programming techniques and concept based learning. | |

| CSCI2031 | Introduction to Unix Programming Lab | L | T | P | S | J | C |
|---|---|---|---|---|---|---|---|
| SDG No.4 | | 0 | 0 | 2 | 0 | 0 | 1 |

**Course Description:**

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

**Course Educational Objectives:**

1. This course introduces basic understanding of UNIX OS, UNIX commands and File system and to familiarize students with the Linux environment.

2. To make student learn fundamentals of shell scripting and shell programming. Emphases are on making student familiar with UNIX environment and issues related to it.

3. Student learn technical communication and effective use of concepts and terminology.

4. Student Ability to practice and understand specifications, scripts and programs.

5. Individual capability in problem solving using the tools presented within the lab.

**List of Experiments**

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

**References:**

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

**Course Outcomes:**

Upon completion of the course, the student is able to

- Able to develop and understand Unix commands.
- Understand various Unix commands.
- Able to develop and implement shell script programs.
- Construct applications using control structure.
- Construct applications using control structureand shell commands.

**CO-PO Mapping:**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PSO1 | PSO2 | PSO3 | PSO4 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 3 |
| CO2 | 1 | 2 | 3 | 2 | 3 | 1 | 3 | 1 | 2 | 3 | 1 |
| CO3 | 1 | 2 | 3 | 1 | 3 | 1 | 3 | 2 | 3 | 1 | 2 |
| CO4 | 1 | 2 | 3 | 1 | 3 | 1 | 3 | 2 | 3 | 1 | 2 |
| CO5 | 1 | 2 | 3 | 1 | 3 | 1 | 3 | 2 | 3 | 1 | 2 |

Note: 1 - Low Correlation 2 - Medium Correlation 3 - High Correlation

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|---|---|
| **APPROVED IN:** | |
| **BOS :** | **ACADEMIC COUNCIL:** |
| | |
| **SDG No. & Statement:** | |
| 4. Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all. | |
| **SDG Justification:** | |
| The topics included in this course are designed to get acquainted with one of the skills that handle necessary mathematical orientation, programming techniques and concept based learning. | |

| CSCI2041 | Principles of Software Engineering | L | T | P | S | J | C |
|---|---|---|---|---|---|---|---|
| SDG No.4 | | 4 | 0 | 0 | 0 | 0 | 4 |

**Course Description:**

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

**Course Educational Objectives:**

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

**UNIT 1** **8 hours**

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

**UNIT 2** **8 hours**

**Agile software development & Requirements Engineering:**

**Agile software development:** Agile methods, Plan-driven and agile development, Contents, Extreme programming, Agile project management, scaling agile methods.

**Requirements Engineering:** Functional and non-functional requirements, The software Requirements Document, Requirements specification, Requirements engineering processes, Requirements elicitation & analysis, Requirements validation, Requirements management.

**UNIT 3** **8 hours**

**System modeling:** Context models, Interaction models, Structural models, Behavioral models, Model-driven engineering.

**UNIT 4** **8 hours**

**Architectural design:** Architectural design decisions, Architectural views, Architectural patterns, Application architectures.

**UNIT 5** **8 hours**

Design and Implementation: Object-oriented design using the UML, Design patterns, Implementation issues, Open source development.
Software Testing: Software testing, Development testing, Test driven development, Reuse testing, User testing.

**Textbooks:**

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

**References:**

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

**Course Outcomes:**

On successful completion of this course, students will be able to:

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

system.(L3)

**CO-PO Mapping:**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PSO1 | PSO2 | PSO3 | PSO4 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 2 | 1 | 1 | 1 | | 1 | 3 | 1 | 3 | 1 |
| CO2 | 3 | 2 | 1 | 1 | 1 | | 1 | 3 | 1 | 3 | 1 |
| CO3 | 3 | 2 | 1 | 1 | 1 | | 1 | 3 | 1 | 3 | 1 |
| CO4 | 3 | 2 | 1 | 1 | 1 | | 1 | 3 | 1 | 3 | 1 |
| CO5 | 3 | 2 | 1 | 1 | 1 | | 1 | 3 | 1 | 3 | 1 |

Note: 1 - Low Correlation 2 - Medium Correlation 3 - High Correlation

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|---|---|
| **APPROVED IN:** | |
| **BOS :** | **ACADEMIC COUNCIL:** |
| | |
| **SDG No. & Statement:** | |
| 4. Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all. | |
| **SDG Justification:** | |
| The topics included in this course are designed to get acquainted with one of the skills that handle necessary mathematical orientation, programming techniques and concept based learning. | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **CSCI2051** | **Introduction to Data Communications and Networks** | **L** | **T** | **P** | **S** | **J** | **C** |
| **SDG No.4** | | 4 | 0 | 0 | 0 | 0 | 4 |

**Course Description:**

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

**Course Educational Objectives:**

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

**UNIT 1** **8 hours**

**Data Communications, Networks, Network Models**- OSI Model, TCP/IP Protocol Suite.
**Digital Transmission** - Transmission Modes, Multiplexing, Transmission Media.

**UNIT 2** **8 hours**

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

**Wired LANs:** Ethernet, IEEE standards.

**UNIT 3** **8 hours**

**Error Detection and Correction:** types of errors, redundancy, detection versus correction, forward error correction versus re-transmission, CRC, Cheksum.
**Flow and Error control,** Noisy Channels –stop-and-wait repeat request, go-back-n automatic repeat request, selective repeat automatic repeat request, piggybacking.

**UNIT 4** **8 hours**

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

**UNIT 5** **8 hours**

**Transport layer:** connectionless versus connection-oriented services, reliable versus unreliable, three protocols, User Datagram Protocol(UDP)-well-known ports for UDP, user datagram, checksum, UDP operation, use of UDP,TCP-TCP services, TCP features, segment.
**Application Layer: Domain Name System**. Name Space, Distribution of Name Space, DNS in the Internet, Resolution.

**Textbooks:**

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

**References:**

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

**Course Outcomes:**

Upon completion of the course, the student is able to

- Able to differentiate among and discuss the four levels of addresses (physical, logical port, and specific used by the Internet TCP/Protocols.(L3)
- Identity types of bit errors and explain the concept of bit redundancy.(L3)
- List internetworking principles and how Internet protocols IP, IPv4 and IPv6 operate.(L1)
- List the concept of reliable and unreliable transfer protocol of data and how TCP and UDP.(L1)
- List Application Layer Services.(L1)

**CO-PO Mapping:**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PSO1 | PSO2 | PSO3 | PSO4 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 1 | 2 | 3 | 2 | 2 | 2 | 3 | 2 | 3 | 2 | 2 |
| CO2 | 1 | 2 | 2 | 3 | 2 | 2 | 3 | 3 | 2 | 2 | 2 |
| CO3 | 2 | 2 | 2 | 3 | 2 | 2 | 3 | 2 | 2 | 2 | 2 |
| CO4 | 1 | 2 | 2 | 2 | 2 | 3 | 1 | 3 | 2 | 2 | 2 |
| CO5 | 1 | 1 | 2 | 2 | 2 | 3 | 3 | 2 | 2 | 2 | 2 |

Note: 1 - Low Correlation 2 - Medium Correlation 3 - High Correlation

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|---|---|
| **APPROVED IN:** | |
| **BOS :** | **ACADEMIC COUNCIL:** |
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| **SDG No. & Statement:** | |
| 4. Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all. | |
| **SDG Justification:** | |
| The topics included in this course are designed to get acquainted with one of the skills that handle necessary mathematical orientation, programming techniques and concept based learning. | |

| CSCI2061 | Introduction to Database Management Systems | L | T | P | S | J | C |
|---|---|---|---|---|---|---|---|
| SDG No.4 | | 4 | 0 | 0 | 0 | 0 | 4 |

**Course Description:**

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

**Course Educational Objectives:**

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

**UNIT 1** **8 hours**

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

**UNIT 2** **8 hours**

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

**UNIT 3** **8 hours**

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

**UNIT 4** **8 hours**

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

**UNIT 5** **8 hours**

**Relational Database Design:** Features of Good Relational Design, Atomic Domains and normalization, 1NF, 2NF, 3NF, BCNF, Decomposition using Functional Dependencies, Functional
Dependency Theory, Decomposition Using Functional Dependencies, Decomposition Using Multi- Valued Dependencies, more Normal Form and Database Design Process & Modeling Temporal Data.

**Textbooks:**

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

**References:**

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

**Course Outcomes:**

Upon completion of the course, the student is able to

- Explain the Fundamentals of Database Management System ,Various applications of DBMS.
- Convert the ER Model to relational tables ,populate and formulate the relational algebra queries
- Discuss and design the complex queries based on relational database models
- Discuss the Entity –Relationship modeling ,SQL.
- Explain the Data Normalization and Database design

**CO-PO Mapping:**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PSO1 | PSO2 | PSO3 | PSO4 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | 2 | 3 | 3 | 2 | 1 | 2 | 2 | 1 | 1 | 1 |
| CO2 | 3 | 3 | 2 | 2 | 2 | 1 | 3 | 2 | 2 | 2 | 2 |
| CO3 | 3 | 3 | 2 | 2 | 1 | 1 | 2 | 2 | 2 | 3 | 2 |
| CO4 | 2 | 2 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1 |
| CO5 | 2 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 1 |

Note: 1 - Low Correlation 2 - Medium Correlation 3 - High Correlation

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| **APPROVED IN:** | |
| **BOS :** | **ACADEMIC COUNCIL:** |
| | |
| **SDG No. & Statement:** | |
| 4. Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all. | |
| **SDG Justification:** | |
| The topics included in this course are designed to get acquainted with one of the skills that handle necessary mathematical orientation, programming techniques and concept based learning. | |

| CSCI2071 | Database Management Lab | L | T | P | S | J | C |
|---|---|---|---|---|---|---|---|
| SDG No.4 | | 0 | 0 | 2 | 0 | 0 | 1 |

**Course Description:**

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

**Course Educational Objectives:**

The aim of this lab is to make the students to learn the concepts of SQL

- Demonstrates various DDL,DML,TCL and DCL Statements
- Demonstrate various PL/SQL Programs
- Demonstrate various triggers and cursors

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

**References:**

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

**Course Outcomes:**

Upon completion of the course, the student is able to

1. To implement Create, insert, select commands on the database.
2. Demonstrate the working of different concepts of DBMS
3. Implement, analyze and evaluate the project developed for an application.
4. Design and implement database scheme for a given problem–domain.
5. Normalize a database

**CO-PO Mapping:**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PSO1 | PSO2 | PSO3 | PSO4 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | 3 | 2 | 1 | 2 | 1 | 2 | 2 | 2 | 2 | 3 |
| CO2 | 3 | 2 | 2 | 2 | 2 | 1 | 2 | 2 | 3 | 2 | 1 |
| CO3 | 3 | 3 | 3 | 2 | 2 | 2 | 3 | 2 | 2 | 3 | 2 |
| CO4 | 3 | 3 | 2 | 2 | 2 | 2 | 3 | 2 | 2 | 2 | 3 |
| CO5 | 3 | 3 | 3 | 3 | 2 | 2 | 3 | 2 | 2 | 3 | 3 |

Note: 1 - Low Correlation 2 - Medium Correlation 3 - High Correlation

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|---|---|
| **APPROVED IN:** | |
| **BOS :** | **ACADEMIC COUNCIL:** |
| | |
| **SDG No. & Statement:** | |
| 4. Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all. | |
| **SDG Justification:** | |
| The topics included in this course are designed to get acquainted with one of the skills that handle necessary mathematical orientation, programming techniques and concept based learning. | |

| CSCI2081 | Introduction to Java Programming | L | T | P | S | J | C |
|---|---|---|---|---|---|---|---|
| SDG No.4 | | 4 | 0 | 0 | 0 | 0 | 4 |

**Course Description:**

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

**Course Educational Objectives:**

- To cover preliminaries and learn how to program in basic concepts.
- To understand packages, Interfaces
- To understand the implementation of multi-threading concept.
- To understand exception Handling, String Handling.
- To understand and to implement the concepts of swings and Event handling.

**UNIT 1** **8 hours**

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

**UNIT 2** **8 hours**

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

**UNIT 3** **8 hours**

**Packages, Interfaces and Exception Handling:** Packages, Access Protection, Importing Packages, Interfaces, Exception Handling, Throw and Throws finally.

**UNIT 4** **8 hours**

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

**UNIT 5** **8 hours**

**Event-Driven Programming** : Event- Handling Process, Event- Handling Mechanism, Delegation Model of Event Handling, Event Classes, Event Sources, Event Listeners, Adapter Classes in Event Handling

**Introducing Swings:** AWT vs Swings, Components and Containers, Swing Packages, A Simple Swing Application, Painting in Swing, Designing Swing GUI Application using Buttons, Labels, Checkboxes, Radio Buttons, ScrollPane, List, ComboBox, , Tables, Scroll pane and Menus

**Textbooks:**

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

**References:**

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

4. Thinking in Java by Bruce Eckel, Prentice Hall, 2nd edition,2002.

**Course Outcomes:**

Upon completion of the course, the student is able to

- To demonstrate data types and control statements
- To develop class and objects and constructors
- To explain packages and exception handling concepts
- To develop programs using Multi-threading concepts
- To create user forms using Swings and perform event handling

**CO-PO Mapping:**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PSO1 | PSO2 | PSO3 | PSO4 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| CO2 | 3 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| CO3 | 3 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| CO4 | 3 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| CO5 | 3 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |

Note: 1 - Low Correlation 2 - Medium Correlation 3 - High Correlation

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|---|---|
| **APPROVED IN:** | |
| **BOS :1-7-2023** | **ACADEMIC COUNCIL:** |
| | |
| **SDG No. & Statement:** | |
| 4. Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all. | |
| **SDG Justification:** | |
| The topics included in this course are designed to get acquainted with one of the skills that handle necessary mathematical orientation, programming techniques and concept based learning. | |

| CSCI2091 | Java Programming Lab | L | T | P | S | J | C |
|---|---|---|---|---|---|---|---|
| SDG No.4 | | 0 | 0 | 2 | 0 | 0 | 1 |

**Course Description:**

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

**Course Educational Objectives:**

- To write programs using abstract classes.
- To write programs for solving real world problems using object oriented concepts.
- To write multithreaded programs.
- To design user forms using Swing components and perform Event handling

**List of Experiments:**

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

**References:**

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

**Course Outcomes:**

Upon completion of the course, the student is able to

- An ability to analyze a problem and identify and define the computing requirements appropriate for its solution under given constraints.(L2)
- Understand the importance of OOP and describe the Multithreading concepts.(L2)
- An ability to perform experiments to analyze and interpret data for different applications of exception handling.(L2)
- Create Java programs using inheritance and polymorphism and Implement error-handling techniques using exception handling and multithreading.(L3)
- Create user forms and perform Event handling for Swing components.(L3)

**CO-PO Mapping:**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PSO1 | PSO2 | PSO3 | PSO4 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| CO2 | 3 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| CO3 | 3 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| CO4 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| CO5 | 3 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |

Note: 1 - Low Correlation 2 - Medium Correlation 3 - High Correlation

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|---|---|
| **APPROVED IN:** | |
| **BOS :1-7-2023** | **ACADEMIC COUNCIL:** |
| | |
| **SDG No. & Statement:** | |
| 4. Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all. | |
| **SDG Justification:** | |
| The topics included in this course are designed to get acquainted with one of the skills that handle necessary mathematical orientation, programming techniques and concept based learning. | |

| CSCI2121 | Advanced Python Programming Lab | L | T | P | S | J | C |
|---|---|---|---|---|---|---|---|
| SDG No.4 | | 0 | 0 | 2 | 0 | 0 | 1 |

**Course Description:**

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

**Course Educational Objectives:**

- The students will be able to improve Problem solving and programming capability
- The students will learn data analytics through python programming

**List of Experiments**

1. Write a program add.py that takes 2 numbers as command line arguments and prints its sum
2. Write function to computegcd,lcm of two numbers.
3. To write a python program Binary search
4. Write a program to implement Selection sort
5. Write a program to implement Insertion Sort
6. Write a function cumulative_sum to compute cumulative sum o a list of numbers.
7. Write a program to perform addition of two square matrices
8. Write a program to double a given number and add two numbers using lambda()
9. Write a python program which accepts the radiu so far circle
10. From user and computes the area(use math module).
11. Write a program to find sum of two numbers using class and methods
12. Using a numpy module create an array and check the following:
13. a)Type of array b)Dimensions of array c)Shape of array d)Type of elements in array
14. Writeapythonprogramtoconcatenatethedataframeswithtwodifferentobjects
15. WriteapythonprogramtodefineamoduleandimportaSpecificfunctioninthatmodule toanotherprogram.
16. Write a python program to illustrate the concept of polymorphism in python
17. Write a python code to set background color and pic and draw
18. A square and fill the color using turtle module

**Textbooks:**

1. Starting Out with Python, Tony Gaddis, Haywood Community College, Pearson,2018.

**References:**

1. Core Python Programming, Wesley J. Chun, Prentice Hall PTR, First Edition,2000.
2. How to Think Like a Computer Scientist: Learning with Python by Jeffrey Elkner, Allen B. Downey and Chris Meyers, Samurai Media Limited,2016.

**Course Outcomes:**

On successful completion of this course, students will be able to:

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

**CO-PO Mapping:**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PSO1 | PSO2 | PSO3 | PSO4 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 2 | 1 | 3 | 2 | 1 | 2 | 1 | 2 | 1 | 3 |
| CO2 | 2 | 1 | 3 | 1 | 1 | 2 | 3 | 2 | 3 | 2 | 1 |
| CO3 | 3 | 2 | 3 | 3 | 2 | 1 | 1 | 2 | 2 | 3 | 1 |
| CO4 | 1 | 2 | 1 | 1 | 2 | 3 | 2 | 3 | 1 | 2 | 1 |
| CO5 | 1 | 3 | 2 | 1 | 2 | 1 | 1 | 2 | 1 | 1 | 2 |

Note: 1 - Low Correlation 2 - Medium Correlation 3 - High Correlation

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|---|---|
| **APPROVED IN:** | |
| **BOS :** | **ACADEMIC COUNCIL:** |
| | |
| **SDG No. & Statement:** | |
| 4. Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all. | |
| **SDG Justification:** | |
| The topics included in this course are designed to get acquainted with one of the skills that handle necessary mathematical orientation, programming techniques and concept based learning. | |

| CSCI3001 | Object Oriented Analysis and Design | L | T | P | S | J | C |
|---|---|---|---|---|---|---|---|
| SDG No.4 | | 4 | 0 | 0 | 0 | 0 | 4 |

**Course Description:**

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

**Course Educational Objectives:**

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

**UNIT 1** **8 hours**

**System Development (Introduction):**

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

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

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

**UNIT 2** **8 hours**

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

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

**UNIT 3** **8 hours**

Object-Oriented Analysis Process: Identifying use cases – Introduction, Why Analysis is a difficult Activity, Business Object Analysis, Use-Case Driven Object Analysis, Business Process Modeling, Use-Case Model, Developing Effective Documentation, Case Study.

**Object Analysis – Classification:** Classifications Theory, Approaches of Identifying Classes, Noun Phrase Approach, Common Class Patterns Approach, Classes, Responsibilities and collaborators, naming classes.

**UNIT 4** **8 hours**

**Identifying Object Relationships, Attributes, and Methods:** Associations, Super-Sub Class Relationships, Aggregation, Class Responsibility, Object Responsibility.

**Design Processes and Design Axioms:** Object-Oriented Design Process, Object-Oriented Design Axioms, Corollaries, Design Patterns

**Class Design:** The Process, Class Visibility, Refining Attributes, Designing Methods and Protocols, Packages and Managing Classes, Case Studies.

**UNIT 5** **8 hours**

**Object Storage and Object Interoperability:** Database Management Systems, Logical and Physical Database Organization and Access Control, Distributed Databases and Client-Server Computing, Next Generation of Client-Server Computing, The pure world, The Practical World, Multi-database Systems, Designing Access Layer Classes, Case Study.

**View layer :** User Interface Design as a creative Process, Designing View Layer Classes, Macro-Level Process, Micro-Level Process, The Purpose, Prototyping the User Interface, Case Study

**Textbooks:**

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

**References:**

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

**Course Outcomes:**

Upon completion of the course, the student is able to

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

**CO-PO Mapping:**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PSO1 | PSO2 | PSO3 | PSO4 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 3 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 2 | 1 |
| CO2 | 3 | 3 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| CO3 | 3 | 3 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 1 |
| CO4 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 1 |
| CO5 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 1 |

Note: 1 - Low Correlation 2 - Medium Correlation 3 - High Correlation

| **APPROVED IN:** | |
|---|---|
| **BOS :** | **ACADEMIC COUNCIL:** |
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| **SDG No. & Statement:** | |
| 4. Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all. | |
| **SDG Justification:** | |
| The topics included in this course are designed to get acquainted with one of the skills that handle necessary mathematical orientation, programming techniques and concept based learning. | |

| CSCI3041 | PHP Programming | L | T | P | S | J | C |
|---|---|---|---|---|---|---|---|
| SDG No.4 | | 4 | 0 | 0 | 0 | 0 | 4 |

**Course Description:**

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

**Course Educational Objectives:**

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

**UNIT 1** **8 hours**

**Introduction** :What is PHP? – History of PHP – Installing PHP – Language Basics: Lexical Structure – Data types – What's a Variable?– PHP variable and value types – Using PHP Variables – Expression and Operators – #Flow Control statements#

**UNIT 2** **8 hours**

**Functions :**Calling a function – Defining a function – Introduction to Strings – Comparing Strings – Manipulating and Searching strings – #Arrays: Types of Arrays# – Array functions – Storing data in Arrays

**UNIT 3** **8 hours**

**Form Handling:** Form Validation – $_GET variable – $_ POST variable – $_REQUEST variable – Creating the Form –#Creating the Upload script# – Using your File system: File paths and permissions – Displaying directory contents – Working with fopen( ) and fclose( )

**UNIT 4** **8 hours**

**Using Cookies :**What are Cookies? – Setting Cookies – Using Cookie variables – Session Basics: What's a session? – Understanding Session variables – Managing User preferences with Sessions – Graphics: Drawing functions – #Creating and Drawing images#.

**UNIT 5** **8 hours**

Installing and Configuring MySQL :Establishing a connection and poking around – Creating a database table – Inserting data into the table – #Selecting and displaying data

**Textbooks:**

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

**References:**

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

**Course Outcomes:**

On successful completion of this course, students will be able to:

- To build PHP Basic syntax for variable types and calculations(L3)
- To Build Creating conditional structures(L3)
- To Build Storing data in arrays Using PHP built-in functions and creating custom functions(L3)
- To build and understanding POST and GET in form submission(L3)
- To connect MySQL database and displaying data(L3)

**CO-PO Mapping:**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PSO1 | PSO2 | PSO3 | PSO4 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 1 | 2 | 2 |
| CO2 | 3 | 1 | 1 | 1 | 1 | 1 | 2 | 3 | 1 | 2 | 2 |
| CO3 | 3 | 1 | 1 | 1 | 1 | 1 | 2 | 3 | 1 | 2 | 2 |
| CO4 | 3 | 2 | 1 | 1 | 1 | 1 | 2 | 3 | 1 | 2 | 1 |
| CO5 | 2 | 2 | 1 | 1 | 1 | 2 | 1 | 2 | 1 | 2 | 2 |

Note: 1 - Low Correlation 2 - Medium Correlation 3 - High Correlation

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| **APPROVED IN:** | |
| **BOS :** | **ACADEMIC COUNCIL:** |
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| **SDG No. & Statement:** | |
| 4. Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all. | |
| **SDG Justification:** | |
| The topics included in this course are designed to get acquainted with one of the skills that handle necessary mathematical orientation, programming techniques and concept based learning. | |

| CSCI3051 | PHP Programming Lab | L | T | P | S | J | C |
|---|---|---|---|---|---|---|---|
| SDG No.4 | | 0 | 0 | 2 | 0 | 0 | 1 |

**Course Description:**

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

**Course Educational Objectives:**

- To learn writing and testing basic PHP programs
- To practice use of Indexed and Associative Arrays
- To write PHP code to display parameters like last visited date and time in webpage
- To get familiar with downloading files from the server.
- To design webpages for authentication, simple applications.

**List of Experiments:**

1. Write a PHP program to find whether given number is prime or not
2. Write a PHP program using Conditional Statements
3. Write a PHP program to find the maximum value in a given 2 Dimensional Aarray
4. Create a PHP page using functions for comparing three integers and print the largest number
5. Write a PHP program to find the factorial of a given number using user-defined functions
6. Design a simple web page to generate multiplication table for a given number using PHP.
7. Write a PHP program to print Fibonacci series using recursion.
8. Write a PHP program to illustrate Indexed Arrays
9. Write a PHP program to illustrate Associative Arrays
10. Write a PHP program to illustrate two Dimensional array
11. Write a PHP program to down load a file from the server.
12. Write a PHP program to store the current date and time in a COOKIE and display the‘ Last Visited’ date and time on the webpage.
13. Write a PHP program to store page views count in SESSION, to increment the count on each refresh and to show the count on web page.
14. Write a PHP program to design a simple calculator
15. Design an authentication web page in PHP with MySQL to check username and password.

**Textbooks:**

1. Julie Meloni and Matt Telles,'PHP 6 Fast and Easy Web Development',1st,Delmar

Cengage Learning,USA,2008,1598634712

**Course Outcomes:**

On successful completion of this course, students will be able to:

- To build PHP Basic syntax for variable types and calculations(L3)
- To Build Creating conditional structures(L3)
- To Build Storing data in arrays Using PHP built-in functions and creating custom functions(L3)
- To build and understanding POST and GET in form submission(L3)
- To connect MySQL database and displaying data(L3)

**CO-PO Mapping:**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PSO1 | PSO2 | PSO3 | PSO4 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 1 | 2 | 2 |
| CO2 | 3 | 1 | 1 | 1 | 1 | 1 | 2 | 3 | 1 | 2 | 2 |
| CO3 | 3 | 1 | 1 | 1 | 1 | 1 | 2 | 3 | 1 | 2 | 2 |
| CO4 | 3 | 2 | 1 | 1 | 1 | 1 | 2 | 3 | 1 | 2 | 1 |
| CO5 | 2 | 2 | 1 | 1 | 1 | 2 | 1 | 2 | 1 | 2 | 2 |

Note: 1 - Low Correlation 2 - Medium Correlation 3 - High Correlation

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|---|---|
| **APPROVED IN:** | |
| **BOS :** | **ACADEMIC COUNCIL:** |
| | |
| **SDG No. & Statement:** | |
| 4. Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all. | |
| **SDG Justification:** | |
| The topics included in this course are designed to get acquainted with one of the skills that handle necessary mathematical orientation, programming techniques and concept based learning. | |

| CSCI3061 | Data Visualization Using Tableau Lab | L | T | P | S | J | C |
|---|---|---|---|---|---|---|---|
| SDG No.4 | | 0 | 0 | 2 | 0 | 0 | 1 |

**Course Description:**

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

**Course Educational Objectives:**

1. Introduce students to the fundamentals of using Tableau Desktop in the context of business and data analytics

2. The course is focused on project-based learning and covers all of the skills identified in the Tableau Desktop.

3. More specifically, students will explore the role and application of data visualization in the data analysis process using Tableau.

4. They will create and design both static and dynamic tables, data visualizations, dashboards, and stories while incorporating visual design best practices to better communicate insights to the intended audience, such as business stakeholders.

5. Students will also connect multiple external data sources (e.g., Text Files, Excel, SQL databases) to Tableau and optimize large data to efficiently wrangle and analyze real-industry data.

**List of Experiments**

1. Program to Demonstrate the Data Sources, Custom Data View, Extracting Data.
2. Program to Demonstrate the Fields Operations, Editing Metadata.
3. Program to Demonstrate the Data Joining, Data Blending.
4. Program to Demonstrate the Worksheets.
5. Program to Demonstrate the Add Worksheets, Rename Worksheet, Save &Delete Worksheet, Reorder Worksheet, Paged Workbook.
6. Program to Demonstrate the Calculations.
7. Program to Demonstrate the Operators.
8. Program to Demonstrate the Functions.
9. Program to Demonstrate the Numeric Calculations, String Calculations.
10. Program to Demonstrate the Date Calculations, Table Calculations, LOD Expressions.
11. Program to Demonstrate the Sort & Filters, Basic Sorting, Basic Filters.
12. Program to Demonstrate the Quick Filters, Context Filters, Condition Filters, Top Filters
13. Program to Demonstrate the Charts, Bar Chart, Line Chart, Pie Chart, Crosstab,

Scatter Plot.

14. Program to Demonstrate the Bubble Chart, Bullet Graph, Box Plot, Tree Map, Bump Char, Gantt Chart.
15. Program to Demonstrate the Histogram, Motion Charts, Waterfall Charts.

**Textbooks:**

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

**References:**

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

**Course Outcomes:**

Upon completion of the course, the student is able to

1. To demonstrate various programs which includes data ,field operations, date operations.
2. To discuss worksheets and various operations on worksheets.
3. To demonstrate calculations, operations, Designing applications using time serious data and its related concepts.
4. To demonstrate various filters.
5. To demonstrate various charts.

**CO-PO Mapping:**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PSO1 | PSO2 | PSO3 | PSO4 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | 1 | 3 | 2 | 2 | 1 | 1 | 1 | 3 | 1 | 2 |
| CO2 | 1 | 1 | 2 | 2 | 3 | 1 | 2 | 3 | 2 | 3 | 3 |
| CO3 | 3 | 1 | 2 | 3 | 1 | 2 | 1 | 2 | 3 | 3 | 3 |
| CO4 | 1 | 2 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 2 | 2 |
| CO5 | 2 | 2 | 1 | 3 | 2 | 3 | 2 | 2 | 1 | 2 | 2 |

Note: 1 - Low Correlation 2 - Medium Correlation 3 - High Correlation

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| **APPROVED IN:** | |
| **BOS :** | **ACADEMIC COUNCIL:** |
| | |
| **SDG No. & Statement:** | |
| 4. Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all. | |
| **SDG Justification:** | |
| The topics included in this course are designed to get acquainted with one of the skills that handle necessary mathematical orientation, programming techniques and concept based learning. | |

| CSCI3021 | R Programming Lab | L | T | P | S | J | C |
|---|---|---|---|---|---|---|---|
| SDG No.4 | | 0 | 0 | 2 | 0 | 0 | 1 |

**Course Description:**

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

**Course Educational Objectives:**

1. To know how to use R Data types, Strings, Vectors, and Lists while creating applications.
2. To become familiar with loading a workspace that contains a R Data frame, editing the dataset, and saving the workspace, data analysis.
3. To be familiar with the steps involved in creating data visualisations by plotting data using the ggplot package and other methods.
4. To learn how to employ loop functions and data structures.
5. To enable the own spectacular data visualisations by delving deeper into R's graphical capabilities.

1. What is R? and Data Types
    a. Download, Install, Configure
    b. Learn to use help()function
    c. Understand data types in R (logical, numeric,etc)
    d. Convert data types
2. Getting Data In and Out ofR
    a. Create, find, and remove data(vector, matrix, data frame) inR
    b. Read external data into R(.txt,.csv)
    c. Write R data into external files(.txt,.csv)
3. Manipulating on Strings
    a. Understand and manipulate strings(e.g. substr(),scan())
    b. Understand indexing of data in vectors, matrices, and data frames
    c. Graphing techniques to visualize data selection
4. Operators, Vectors ,Matrices, Array, Lists, Data Frames and math functions
    a. Learn about operators(mathematics, logical, miscellaneous)
    b. Learn about basic math functions(e.g.sum())
    c. Use operators and math functions onvariables
5. Plotting Data
    a. Dot Plots
    b. Histograms
    c. Box Plots
6. Using Control Structures
    a. Understand if else statement
    b. Use if else statement for data manipulation
    c. Compare if else statement with ifelse()function
    d. Learn about ifelse() function
    e. Use ifelse() function on vectors and matrices

f. Use graphs to show the results

7. Working with Loops
    a. Understand how loops work in R
    b. Create your own loop for vectors
    c. Create a series of graphs with loop functions
    d. Learn to use break and next statements in loops
    e. Use loops to create and change data in vectors, matrices, and arrays
    f. Use loops to create data as a list
    g. Learn about double loops
    h. Create your own double loops for matrix
    i. Use operators and functions in single and double loops
8. Using control structure, math function in loops
    a. Use ifelse() function in loops
    b. Combine loops and if else statement
    c. Represent your results with graphs
    d. Use math functions in loops
    e. Use math functions in if else statement
    f. Show your results with graphs
9. Understand advanced functions such as apply() andby()
10. Use apply() and by() to calculate descriptive statistics
11. Create graphs for the calculated descriptive statistics

**References:**

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

**Course Outcomes:**

Upon completion of the course, the student is able to

1. To discuss data in and out of R ,Strings, operators, vectors list motivation for learning a programming language
2. To transform your datasets into a form convenient for analysis
3. To demonstrate plotting of data with various techniques
4. To examine control structures and working with loops
5. To learn advanced functions and create graphs for statistics

**CO-PO Mapping:**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PSO1 | PSO2 | PSO3 | PSO4 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 2 | 3 | 3 | 2 | 2 | 1 | 2 | 2 | 3 | 2 |
| CO2 | 3 | 3 | 2 | 2 | 1 | 2 | 2 | 3 | 2 | 3 | 2 |
| CO3 | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 3 | 3 | 2 |
| CO4 | 1 | 1 | 3 | 2 | 2 | 1 | 1 | 3 | 1 | 3 | 1 |
| CO5 | 3 | 1 | 3 | 3 | 2 | 2 | 2 | 1 | 3 | 2 | 1 |

Note: 1 - Low Correlation 2 - Medium Correlation 3 - High Correlation

| **APPROVED IN:** | |
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| **BOS :** | **ACADEMIC COUNCIL:** |
| | |
| **SDG No. & Statement:** | |
| 4. Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all. | |
| **SDG Justification:** | |
| The topics included in this course are designed to get acquainted with one of the skills that handle necessary mathematical orientation, programming techniques and concept based learning. | |

| CSCI3071 | Introduction to Cloud Computing | L | T | P | S | J | C |
|---|---|---|---|---|---|---|---|
| SDG No.4 | | 4 | 0 | 0 | 0 | 0 | 4 |

**Course Description:**

*This course will help the students to get familiar with Cloud Computing Fundamental concepts, technologies, architecture and state-of-the-art in Cloud Computing fundamental issues, technologies, applications and implementations.*

**Course Educational Objectives:**

- To understand basic concepts related to cloud computing technologies and concepts of cloud delivery models IaaS, PaaS and Saas
- To evaluate the underlying principle of Data Center, cloud virtualization, cloud multitenant and service technologies.
- To implement different infrastructure and specialized mechanisms related to cloud storage and usage monitor.
- Fundamentals of cloud computing architectures based on current standards, protocols, and best practices.

**UNIT 1** **8 hours**

**Define:** What is a cloud? Hype cycle, Implantation gap, Common Definition Metaphorical Interpretation, Attributes.

**Cloud Architecture:** Stack Management Layers, Standards and Interoperability, Private Cloud, Community Cloud, Hybrid Cloud, Cloud Maturity.

**UNIT 2** **8 hours**

**Infrastructure as a Service:** Infrastructure Stack, Servers, Storage, Network, Integration, Management, Payment and Billing, Iaas Landscape.

**Platforms a Service:** Web Application Frameworks, Web Hosting Services, Google App Engine, Microsoft Windows Azure, Force.com, Additional Platforms.

**Software as a service:** Customer Relationship Management, Human Resources, Financial, Collaboration, Backup and Recovery, Industry Solutions.

**UNIT 3** **8 hours**

**Benefits and Challenges**: Benefits, Challenges, Recommendations.

**Strategic Impact**: What is Strategy? Strategic Analysis, External Analysis, Internal Analysis, Strategic Realignment.

**Risk Impact**: Notion of Risk, Risk Management, Cloud Impact, Enterprise Wide Risk Management.

**Financial Impact:** Resource Costs, Return on Investment, Cash Flow, Financial Visibility, Return on Assets.

**UNIT 4** **8 hours**

**Requirements Analysis:** Strategic Alignment, Architecture Development Cycle.

**Draft Architecture:** Business Process Modeling, Architecture Modeling, Preliminary Design.

**Application Inventory:** Options, Stakeholders, Business criteria, technical criteria, Cloud Opportunities, Analysis, Net Benefit and Risk, New Opportunities.

**Service Components:** Service Delivery Model, Potential Providers, Evaluation Criteria and Weight.

**UNIT 5** **8 hours**

**User Profiles:** Options, Segmentation Criteria, Profile Classification, Application Map, Identity Management, Compliance.

**End-to-end Design:** Technical Design, Devices, Connectivity, Physical Infrastructure, Management, Metering and Billing, Hybrid Cloud Design.

**Connectivity:** Network Connectivity, Content Delivery Networks, Application Connectivity, Information Connectivity.

**Textbooks:**

1. Cloud Computing Explained by John Rhoton, Recursive Press, 2013.

**References:**

1. Cloud Computing, Principles, Systems and Applications by Nick Antonopoulos and Lee Gilliam Springer International Edition, 2015.
2. Cloud Computing Principles and Paradigms by Raj Kumar Buyya, James Broberg and AnderzejGoscinscinki, Wiley Publications,2011

**Course Outcomes:**

Upon completion of the course, the student is able to

- Define the basic concepts, terminology and the fundamental models.
- Demonstrate the set of primary technology components and characteristics
- associated with cloud computing.
- Discuss various benefits and challenges and various types of impact on cloud.
- Elaborate requirements analysis ,draft architecture ,application inventory and service components of cloud.
- Define user profile, end to end design and connectivity issues of cloud.

**CO-PO Mapping:**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PSO1 | PSO2 | PSO3 | PSO4 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | 1 | 2 | 2 | 3 | 1 | 1 | 3 | 1 | 3 | 3 |
| CO2 | 2 | 2 | 1 | 2 | 3 | 1 | 1 | 2 | 1 | 2 | 1 |
| CO3 | 1 | 2 | 1 | 3 | 2 | 1 | 1 | 1 | 1 | 2 | 1 |
| CO4 | 3 | 1 | 1 | 1 | 1 | 1 | 1 | 3 | 2 | 2 | 1 |
| CO5 | 1 | 2 | 2 | 2 | 1 | 1 | 1 | 2 | 1 | 1 | 2 |

Note: 1 - Low Correlation 2 - Medium Correlation 3 - High Correlation

| **APPROVED IN:** | |
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| **BOS :** | **ACADEMIC COUNCIL:** |
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| **SDG No. & Statement:** | |
| 4. Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all. | |
| **SDG Justification:** | |
| The topics included in this course are designed to get acquainted with one of the skills that handle necessary mathematical orientation, programming techniques and concept based learning. | |

| CSCI3081 | Introduction to Block Chain Technologies | L | T | P | S | J | C |
|---|---|---|---|---|---|---|---|
| SDG No.4 | | 4 | 0 | 0 | 0 | 0 | 4 |

**Course Description:**

*This is new technology of digital currency. Block chains are to achieve decentralization. The system needs to validate transactions without anyone being able to veto transactions or control the network.*

**Course Educational Objectives:**

- To understand distributed systems, the concepts of Block chain technology
- To know types of blockchain and consensus.
- To get a technical overview of decentralization using blockchain and digital currencies like Bitcoin, as well as their broader economic, legal and financial context
- Learn the basic concept of Cryptographic Hash Functions, Hash Pointers and Elliptic Curve Digital Signature Algorithm.
- To get an insight into the working of the Bitcoin network, Wallet, Bitcoin mining and distributed consensus for reliability.

**UNIT 1** **8 hours**

The Growth of Block chain Technology Distributed System: The History of Blockchain and Bitcoin, Types of Block chain, consensus.

**UNIT 2** **8 hours**

Decentralization: Decentralization using block chain, methods of decentralization, routes to decentralization, platform for decentralization.

**UNIT 3** **8 hours**

Public Key Cryptography: Asymmetric cryptography, public and private keys, RSA, Hash Functions, Elliptical Curve Digital Signature Algorithm (ECDSA).

**UNIT 4** **8 hours**

Introduction to Bitcoin: Bitcoin, Digital keys and address, transactions, block chain, mining

**UNIT 5** **8 hours**

Ethereum: Introduction, The Ethereum network, components of Ethereum ecosystem

**Textbooks:**

1. Imran Bashir, "Mastering Blockchain: Distributed Ledger Technology,Decentralization and Smart Contracts Explained", Second Edition, Packt Publishing, 2018.

**References:**

1. Bitcoin and Cryptocurrency Technologies: A Comprehensive Introduction by Arvind Narayanan, Joseph Bonneau, Edward Felten, Andrew Miller and Steven Goldfeder, Princeton Press, 2016.

**Course Outcomes:**

Upon completion of this course student will be able to

- Learn concepts of distributed systems and block chain technology.
- Will get an overview on the types of block chain and consensus
- Understand the concepts of decentralization and crypto currencies.
- Analyze the cryptographic hash functions and digital signature algorithms used in Block chain technology.
- Explain the working of the Bitcoin network, Wallet, Bitcoin mining and distributed consensus for reliability

**CO-PO Mapping:**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PSO1 | PSO2 | PSO3 | PSO4 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 2 | 1 | 1 | 1 | 1 | 2 | 3 | 1 | 3 | 1 |
| CO2 | 3 | 2 | 1 | 1 | 1 | 1 | 2 | 3 | 1 | 3 | 1 |
| CO3 | 3 | 2 | 1 | 1 | 1 | 1 | 2 | 2 | 3 | 3 | 2 |
| CO4 | 3 | 2 | 1 | 1 | 1 | 1 | 2 | 3 | 2 | 2 | 1 |
| CO5 | 3 | 2 | 1 | 1 | 1 | 1 | 2 | 3 | 2 | 2 | 1 |

Note: 1 - Low Correlation 2 - Medium Correlation 3 - High Correlation

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| **APPROVED IN:** | |
| **BOS :** | **ACADEMIC COUNCIL:** |
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| **SDG No. & Statement:** | |
| 4. Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all. | |
| **SDG Justification:** | |
| The topics included in this course are designed to get acquainted with one of the skills that handle necessary mathematical orientation, programming techniques and concept based learning. | |

| CSCI3091 | Project Work | L | T | P | S | J | C |
|---|---|---|---|---|---|---|---|
| SDG No.4 | | 0 | 0 | 12 | 0 | 0 | 12 |

**Course Description:**

*The project work is designed with the objective to prepare the students to take up positions in it industries as programmer, systems designers, software engineers, etc. The projects are to be designed to provide students comprehensive knowledge covering the skills and core areas of computer science in theory and practical's. Six months major project is part of curricula in last semester of BCA.*

**Course Educational Objectives:**

- To help the student develop the ability to apply theoretical and practical tools / techniques to solve real life problems related to industry, academic institutions and research laboratories.
- To get software skills of students in various platforms, of students are supposed to develop quality software solutions by applying theoretical and practical knowledge of various courses learnt.
- To develop Requirement Analysis for the problem that will be considered.
- To develop Design Document from the Requirement Analysis.
- To develop coding and testing for the problem that will be considered.

**Course Outcomes:**

Upon completion of the course, the student is able to

- Skill to apply Software Development Cycle to develop a software module.
- Ability to use the techniques, skills and modern engineering tools necessary for software development.
- Design a Requirement Analysis Document for various real world problems which are to be automated.
- Demonstrate Design Document for real world problems which are to be automated.
- Develop a software product along with its complete documentation.

**CO-PO Mapping:**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PSO1 | PSO2 | PSO3 | PSO4 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 1 | 1 | 1 | 1 | 1 | 3 | 3 | 2 | 3 | 3 |
| CO2 | 3 | 1 | 1 | 1 | 1 | 1 | 3 | 3 | 2 | 3 | 3 |
| CO3 | 3 | 1 | 1 | 1 | 1 | 1 | 3 | 3 | 2 | 3 | 3 |
| CO4 | 3 | 1 | 1 | 1 | 1 | 1 | 3 | 3 | 2 | 3 | 3 |
| CO5 | 3 | 1 | 1 | 1 | 1 | 1 | 3 | 3 | 2 | 3 | 3 |

Note: 1 - Low Correlation 2 - Medium Correlation 3 - High Correlation

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| **APPROVED IN:** | |
| **BOS :** | **ACADEMIC COUNCIL:** |
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| **SDG No. & Statement:** | |
| 4. Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all. | |
| **SDG Justification:** | |
| The topics included in this course are designed to get acquainted with one of the skills that handle necessary mathematical orientation, programming techniques and concept based learning. | |

**Program Elective**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **CSCI2101** | **Introduction to Cryptography** | **L** | **T** | **P** | **S** | **J** | **C** |
| **SDG No.4** | | 4 | 0 | 0 | 0 | 0 | 4 |

**Course Description:**

*Due to rapid growth of digital communication and electronic data exchange information security has become a crucial issue in industry, business and administration. Modern cryptograph provides essential techniques for securing information and protecting data.*

**Course Educational Objectives:**

- To enable the students to understand the importance of information security.
- To make them to understand attacks, cryptography, steganography.
- To know about the ciphers.
- To describe data encryption standards.

**UNIT 1** **8 hours**

**Introduction:** Security goals, Confidentiality, Integrity, Availability, Attacks, Attacks threatening Confidentiality, Attacks Threatening Integrity, Attacks Threatening Availability, Passive versus Active Attacks, Services and Mechanism, Security Services, Security Mechanisms, Relation Between Services and Mechanisms, Techniques, Cryptography, Steganography.

**UNIT 2** **8 hours**

**Traditional Symmetric Key Ciphers:** Introduction, Kerckhoff's Principle, Cryptanalysis, Categories of Traditional ciphers, Substitution Ciphers, Mono alphabetic ciphers, Poly alphabetic Ciphers, Transposition Ciphers, Keyless Transposition Ciphers, Keyed Transposition Ciphers, Combining two approaches

**UNIT 3** **8 hours**

**Stream and Block Ciphers:** Stream ciphers, Block Ciphers, Combination, Introduction to Modern Symmetric Key cipher, Modern Block Ciphers-Substitution or Transposition, Block Ciphers as Permutation Groups, Components of Modern Block Cipher, S-Boxes.

**UNIT 4** **8 hours**

**Product Ciphers:** Introduction, two Classes of Product Ciphers, Feistel Ciphers, Non-Feistel Ciphers, Attacks on Blocks Ciphers, Modern Stream Ciphers.

**UNIT 5** **8 hours**

**Data Encryption Standard (DES):** Introduction, DES Structure, Multiple DES. Asymmetric-Key Cryptography: Introduction, RSA Cryptosystem.

**Textbooks:**

1. Cryptography and Network Security by Behrouz A. Forouzan, Tata McGraw-Hill Special Indian edition, 2007.

**References:**


- Cryptography and Network Security by William Stallings, Pearson Education,2011.
- Cryptography and Network Security by AtulKahate, Tata McGraw-Hill Publishing Company Limited,2003.


**Course Outcomes:**

Upon completion of the course the student will be able to

- Understand the importance of computer security.
- Identify the differences between different types of ciphers.
- List the concepts of block ciphers and stream ciphers.
- Able to outline structure of DES
- List the concepts of asymmetric key cryptography.

**CO-PO Mapping:**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PSO1 | PSO2 | PSO3 | PSO4 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 3 | 2 |
| CO2 | 3 | 1 | 1 | 1 | 1 | 1 | 1 | 3 | 2 | 2 | 2 |
| CO3 | 3 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 3 | 2 |
| CO4 | 3 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 3 | 2 |
| CO5 | 3 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 3 | 2 |

Note: 1 - Low Correlation 2 - Medium Correlation 3 - High Correlation

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| **APPROVED IN:** | |
| **BOS :** | **ACADEMIC COUNCIL:** |
| | |
| **SDG No. & Statement:** | |
| 4. Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all. | |
| **SDG Justification:** | |
| The topics included in this course are designed to get acquainted with one of the skills that handle necessary mathematical orientation, programming techniques and concept based learning. | |

| CSCI2111 | Fundamentals of Artificial Intelligence | L | T | P | S | J | C |
|---|---|---|---|---|---|---|---|
| SDG No.4 | | 4 | 0 | 0 | 0 | 0 | 4 |

**Course Description:**

*Intelligent machines has replaced human capabilities in many areas. Artificial intelligence is the intelligence exhibited by machines or software. It is the branch of computer science that emphasizes on creating intelligent machines that work and react like humans. Artificial Intelligence spans a wide variety of topics in computer science research, including machine learning, deep learning, reinforcement learning, natural language processing, reasoning, perception etc.*

**Course Educational Objectives:**

- The fundamental concepts of Artificial Intelligence and the participants will get to learn in the future about Machine learning, Deep Learning, explore the Platforms for AI, implement methods to solve problems using Artificial Intelligence and Natural Language Processing, etc.
- To make the students to understand about the building blocks of AI such as Search, Knowledge representation, inference, logic, and learning and the concepts of Natural Language Processing.

**UNIT 1** **8 hours**

**Introduction:** Introduction to Artificial Intelligence, Historical Backdrop, What is Intelligence, The bottom line.

**State Space Search:** Generate the test, Simple search, Depth First Search (DFS), Breadth First Search (BFS), Comparison of BFS and DFS, Quality of solution, Depth Bounded DFS ( DBDFS), Depth First Iterative Deepening(DFID).

**UNIT 2** **8 hours**

**Heuristic Search:** Heuristic Functions, Best First Search, Hill Climbing, Local Maxima, Solution Space Search, Variable Neighborhood Descent, Beam Search, Tabu Search, Peak to Peak Methods.

**UNIT 3** **8 hours**

**Finding Optimal Paths:** Brute Force, Branch and Bound, Refinement Search, Dijkstra's Algorithm, Algorithm A*, Admissibility of A*, Iterative Depending A* (IDA*), Recursive Best First Search (RBFS), Pruning the CLOSED list, Pruning the OPEN list, Divide and Conquer Beam Stack Search.

**UNIT-4** 8 hours

**Knowledge Representation** : Representations and mapping ,Knowledge representations approaches ,types of Knowledge's, issues in knowledge representation ,Procedural and Declarative knowledge

Advanced Knowledge Representation: semantic Nets, Frames, Scripts and Conceptual dependency .

**UNIT -5**

**Logical Reasoning: Propositional** Logic, first order predicate logic(FOPL).

Natural Language Processing :Classic problems in NLP and schools of thought ,B Techniques, Applications ,Natural Language processing

**Textbooks:**

1. A first course in Artificial Intelligence by Deepak Khemani, TMH, 2013.

**References:**

1.Understanding the basic concepts by Binto George, Gail Carmichael, CST,2016. Artificial Intelligence by Elaine Rich, Kevin Knight, Shivashankar B Nair TMH, 3rdedition.

2.Artificial Intelligence simplified thebasic concepts byBinto George, Gail Carmichael, CST,2016.

1.

**Course Outcomes:**

Upon completion of the course, the student is able to

- Discuss the basic fundamental concepts of Artificial Intelligence.
- What is the future of AI.
- Explain different AI techniques used.
- Develop Applications of AI.
- Discuss Natural Language Processing Concepts

**CO-PO Mapping:**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PSO1 | PSO2 | PSO3 | PSO4 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | 3 | 1 | 1 | 2 | 2 | 2 | 3 | 1 | 3 | 1 |
| CO2 | 3 | 3 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 1 | 2 |
| CO3 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| CO4 | 2 | 1 | 2 | 1 | 1 | 1 | 1 | 3 | 3 | 3 | 3 |
| CO5 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |

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| **APPROVED IN:** | |
| **BOS :** | **ACADEMIC COUNCIL:** |
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| **SDG No. & Statement:** | |
| 4. Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all. | |
| **SDG Justification:** | |
| The topics included in this course are designed to get acquainted with one of the skills that handle necessary mathematical orientation, programming techniques and concept based learning. | |

| | Introduction to Data Mining | L | T | P | S | J | C |
|---|---|---|---|---|---|---|---|
| **CSCI3011** | | | | | | | |
| **SDG No.4** | | 4 | 0 | 0 | 0 | 0 | 4 |

**Course Description:**

*Data warehousing and data mining is one of the most advanced fields of computer science which involves use of Mathematics, Statistics, Information Technology and information Sciences in discovering new information and knowledge from large databases It is a new emerging interdisciplinary area of research and development which has created interest among scientists of various disciplines like computer science, mathematics, statistics, information technology.*

**Course Educational Objectives:**

- To learn the basic concepts and techniques of data mining,
- To study about Frequent Item sets and Related Algorithms and Classification,
- To learn about Clustering Concepts.

**UNIT 1** **8 hours**

**Introduction:** What motivated data mining? why is it important? What is data mining? data mining-on what kind of data? data mining functionalities, what kinds of patterns can be mined? Are all of the patterns interesting? Classification of data mining systems, Data mining task primitives, Integration of a data mining system with a database or data warehouse system

**8 hours**

**UNIT 2**

**Data pre-processing:** Types of data sets and attribute values, basic statistical descriptions of data, data visualization, measuring data similarity, data quality, major tasks in data preprocessing, data reduction, Data transformation and data discretization, data cleaning and data integration.

**UNIT 3** **8 hours**

**Mining frequent patterns, associations and correlations:** Basic concepts, applications of frequent pattern and associations, frequent pattern and association mining, mining various kinds of association rules, a priori algorithm, FP growth algorithm.

**UNIT 4** **8 hours**

**Classification Analysis:** Classification: Basic concepts, decision tree induction, Bayes classification methods, rule-based classification, model evaluation and selection, classification by neural networks, techniques to improve classification accuracy.

**UNIT 5** **8 hours**

**Cluster Analysis:** Basic concepts and methods, clustering structures, major clustering approaches, partitioning methods, hierarchical methods, density based methods, model-based clustering: the expectation-maximization method.

**Textbooks:**

1. Data Mining: Concepts and Techniques by Jiawei Han, MichelineKamber, JianPei ,Morgan Kaufmann publishers, 3rd edition,2011.

**References:**

2. Introduction to Data Mining by Michael Steinbach, Vipin Kumar, Pang-Ning Tan,
3. Addison Wesley, 1/e ,2006.
4. Data Mining: Introductory and Advanced Topics by Margaret H. Dunham, Data,1/e Pearson Publishers,2006.

**Course Outcomes:**

Upon completion of the course, the student is able to

- Discuss and define data warehousing and data mining.
- Interpret data and apply preprocessing techniques.
- Explain association rule mining algorithms and evaluate patterns.
- Explain various classification techniques and find accuracy.
- Elaborate various clustering methods and evaluate them

**CO-PO Mapping:**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PSO1 | PSO2 | PSO3 | PSO4 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | 3 | 1 | 1 | 2 | 2 | 2 | 3 | 1 | 3 | 1 |
| CO2 | 3 | 3 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 1 | 2 |
| CO3 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| CO4 | 2 | 1 | 2 | 1 | 1 | 1 | 1 | 3 | 3 | 3 | 3 |
| CO5 | | | | | | | | | | | |

Note: 1 - Low Correlation 2 - Medium Correlation 3 - High Correlation

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| **APPROVED IN:** | |
| **BOS :** | **ACADEMIC COUNCIL:** |
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| **SDG No. & Statement:** | |
| 4. Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all. | |
| **SDG Justification:** | |
| The topics included in this course are designed to get acquainted with one of the skills that handle necessary mathematical orientation, programming techniques and concept based learning. | |

| CSCI3031 | Foundation of Data Science | L | T | P | S | J | C |
|---|---|---|---|---|---|---|---|
| SDG No.4 | | 4 | 0 | 0 | 0 | 0 | 4 |

**Course Description:**

*This course covers foundational techniques and tools required for data science. The course focuses on concepts, principles, and techniques applicable to any technology environment and industry and establishes a baseline that can be enhanced by further formal training and additional real-world experience.*

**Course Educational Objectives:**

- To discuss basics of python programming and its related concepts.
- To demonstrate data in various visual representation and learn about mathematical concepts of linear algebra and statistics.
- To learn machine learning concepts and its various algorithms.
- To discuss various regression and decision tree concepts.
- To learn neural networks, clustering, natural language processing.

**UNIT 1** **8 hours**

**A crash course in Python :** The basics, Getting Python, The Zen of Python, Whitespace Formatting, Modules, Arithmetic, Functions, Strings, Exceptions, Lists, Tuples, Dictionaries, Sets, Control flow, Sorting, Generators and Iterators, Randomness, Regular Expressions, Object-Oriented Programming, Functional Tools, enumerate.

**UNIT 2** **8 hours**

**Visualizing Data:**Matplotlib, Bar charts, Line Charts, Scatter plots.
**Linear Algebra:** Vectors, Matrices.
**Statistics:** Describing a single set of data, Central Tendencies, Dispersion, Correlation, Simpson's Paradox, Correlation and Causation.

**UNIT 3** **8 hours**

**Machine Learning:** Modeling, What Is Machine Learning, Over fitting and Under fitting , Correctness , The Bias-Variance Trade-off , Feature Extraction and Selection
**K-Nearest Neighbors:** The Model, The Curse of Dimensionality
**Naive Bayes:** A Really Dumb Spam Filter, A More Sophisticated Spam Filter, Implementation, Testing Our Model
**Simple Linear Regression:** The Model , Using Gradient Descent , Maximum Likelihood Estimation.

**UNIT 4** **8 hours**

**Multiple Regressions:** The Model, Further Assumptions of the Least Squares Model, Fitting the Model, Interpreting the Model, Goodness of Fit
**Logistic Regression:** The Problem, The Logistic Function, Applying the Model, Goodness of Fit, Support Vector Machines
**Decision Trees:** What Is a Decision Tree? , Entropy, The Entropy of a Partition, Creating a Decision Tree, Putting It All Together, Random Forests.

**UNIT 5** **8 hours**

**Neural Networks:**Perceptions , Feed-Forward Neural Networks, Back propagation

**Clustering:** The Model ,Example: Meetups , Choosing k , Example: Clustering Colors, Bottom-up Hierarchical Clustering.
**Natural Language Processing:** Word Clouds, n-gram Models, Grammars

**Textbooks:**

1. Data Science from Scratch First Principles with python by Joel Grus, O'Reilly Media, 2015.

**References:**

2. Data Analytics Made Access by Anil Maheshwari,2019.
3. Python for Data Analysis step-by-step tutorial for Beginners by Samuel Burns, Global Tech and Amazon KDP,2019.

**Course Outcomes:**

**Upon completion of the course, the student is able to**

- List motivation for learning a programming language.(L1)
- To transform data in visualized fashion.(L3)
- To learn linear algebra, various statistical Techniques. (L5)
- To examine Multiple Regressions, Logistic Regression, Decision Trees.(L4)
- To learn Neural Networks, Clustering, Natural Language Processing(L5)

**CO-PO Mapping:**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PSO1 | PSO2 | PSO3 | PSO4 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | - | 1 | - | 1 | 1 | 2 | 1 | - | 2 | 1 |
| CO2 | 2 | 1 | 1 | - | - | 1 | 2 | - | 2 | 2 | 1 |
| CO3 | 2 | - | - | - | - | 1 | 2 | 1 | 2 | 2 | 1 |
| CO4 | 3 | - | 1 | 1 | 1 | 1 | 3 | 1 | 2 | 2 | 1 |
| CO5 | 3 | - | 1 | 1 | 1 | 1 | 3 | 1 | 2 | 2 | 1 |

Note: 1 - Low Correlation 2 - Medium Correlation 3 - High Correlation

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| **APPROVED IN:** | |
| **BOS :** | **ACADEMIC COUNCIL:** |
| | |
| **SDG No. & Statement:** | |
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| **SDG Justification:** | |
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**GITAM School of Science**

**GITAM (Deemed to be Universtiy)**

**Visakhapatnam | Hyderabad | Bengaluru**