**2.6.2 Attainment of POs and COs are evaluated.**

## Supporting Document

| Sr. No. | Particulars |
|---|---|
| 1. | Attainment Levels |
| 2. | Program Outcome Statements |
| 3. | Course Outcome Statements |
| 4. | PO CO Mapping (Course Articulation Matrix) |
| 5. | Average Course Outcome Attainment |
| 6. | Programme Exit Survey |
| 7. | Average Attainment level of CO PO |
| 8. | Gap Analysis and action Taken Report on PO CO Attainment |

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# Programme and Course Outcome Attainment

## Bachelor of Science (Information & Technology)

## Batch 2018 - 2021

| | CO Attainment Method | Attainment Level | | |
|---|---|---|---|---|
| | | 1 | 2 | 3 |
| Direct Assessment | University/ External Examination | *Below 40 % students score more than or equal to 40% marks in the university exams* | *40-49.99 % students score more than or equal to 40% marks in the university exams* | *50% and above students score more than or equal to 40% marks in the university exams* |
| Direct Assessment | Internal Assessment | *50-59.99% students score more than or equal to 50% marks in the internal assessments.* | *60-69.99% students score more than or equal to 50% marks in the internal assessments.* | *70% and above students score more than or equal to 50% marks in the internal assessments.* |
| Indirect Assessment | Programme Exit Survey | *60-69.99 % of students agree with PO Attained* | *70-79.99% of students agree with PO Attained* | *80% and above of students agree with PO Attained* |

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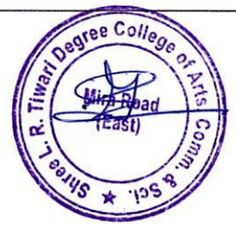
| Program Outcome Statements | | |
|---|---|---|
| **After Successful completion of the B.Sc. (Information Technology) program students will be able to:** | | |
| **PO1** | **Computation Knowledge** | Understand and implement various algorithms methodologies, computing skill and programming knowledge for the conceptualization of computing models. |
| **PO2** | **Formulation of Solution** | Ability to renovate complex business circumstances and contemporary issues into problems, examine, Explore, understand and propose cohesive solutions using latest technologies. |
| **PO3** | **Problem Investigation** | Ability to identify, critically analyse and formulate complex computing problems using power of Information and use of technology to solve real life problems. Moreover, to develop and conduct experiments, interpret data form result and provide well informed solution. |
| **PO4** | **Emerging Technology Uses** | Ability to select modern computing tools, software, problem solving skills and techniques necessary for innovative software/hardware development. |
| **PO5** | **Project Management** | Ability to understand management and computing principles with computing knowledge to manage projects in multidisciplinary environments. |
| **PO6** | **Innovation and Entrepreneurship** | Recognize opportunities, entrepreneurship vision and use of innovative ideas to create value and wealth for the betterment of the individual and society. |
| **PO7** | **Communication Efficacy** | Ability to communicate more effectively with the working team members, project manager and computing community as well as society by being able to comprehend effective documentations and presentations. |
| **PO8** | **Professional Ethics** | Ability to apply and commit professional ethics and cyber regulations in a global economic environment. Recognize the need for and develop the ability to engage in continuous learning as a Computing professional |



**COURSE OUTCOME**

| Course Outcome Statements | |
|---|---|
| **After Successful completion of the course students will be able to :** | |
| **CO 1** | To calculate and apply measures of central tendencies and measures of dispersion -- grouped and ungrouped data cases. |
| **CO 2** | To calculate the moments, skewness and kurtosis by various methods. |
| **CO 3** | How to apply discrete and continuous probability distributions to various business problems. |
| **CO 4** | Perform Test of Hypothesis as well as calculate confidence interval for a population parameter for single sample and two sample cases. Understand the concept of p-values |
| **CO 5** | Apply simple linear regression and correlation model to real life examples. |

**PO CO Mapping**

| Course Articulation Matrix | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Academic Year: 2022-23** | | | | | **Course Code: USIT403** | | | | |
| **Program: B. Sc (Information Technology)** | | | | | **Course Name: Computer Orientated Statistical Techniques** | | | | |
| **Department: IT** | | | | | **Faculty: Asst. Prof. Kshitij Jha** | | | | |
| **CO** | **Statement** | **Programme Outcome** | | | | | | | |
| | | PO-1 | PO-2 | PO-3 | PO-4 | PO-5 | PO-6 | PO-7 | PO-8 |
| **1** | To calculate and apply measures of central tendencies and measures of dispersion -- grouped and ungrouped data cases. | 3.00 | 3.00 | 2.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| **2** | To calculate the moments, skewness and kurtosis by various methods. | 3.00 | 3.00 | 2.00 | 2.00 | 2.00 | 1.00 | 1.00 | 1.00 |
| **3** | How to apply discrete and continuous probability distributions to various business problems. | 3.00 | 2.00 | 3.00 | 1.00 | 2.00 | 1.00 | 1.00 | 1.00 |
| **4** | Perform Test of Hypothesis as well as calculate confidence interval for a population parameter for single sample and two sample cases. Understand the concept of p-values. | 3.00 | 3.00 | 2.00 | 2.00 | 1.00 | 1.00 | 2.00 | 1.00 |
| **5** | Apply simple linear regression and correlation model to real life examples. | 3.00 | 3.00 | 3.00 | 2.00 | 2.00 | 2.00 | 1.00 | 3.00 |
| | **Average** | **3.00** | **2.80** | **2.40** | **1.60** | **1.60** | **1.20** | **1.20** | **1.40** |
| **Note:** | | | | | | | | | |
| **A. Enter correlation levels 1, 2 or 3 as defined below: 1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High) If there is no correlation, put "-"** | | | | | | | | | |
| **B. Add more columns for PSOs** | | | | | | | | | |

**ATTAINMENT**

**Sem II (BATCH 2018-2019)**

**Subject: Numerical and Statistical Methods**

| Direct Assessment | PO-1 | PO-2 | PO-3 | PO-4 | PO-5 | PO-6 | PO-7 | PO-8 |
|---|---|---|---|---|---|---|---|---|
| Internal Examination | 0.67 | 0.75 | 0.92 | 0.58 | 0.50 | 0.33 | 0.50 | 0.33 |
| External Examination | 2.00 | 2.40 | 2.80 | 1.60 | 1.60 | 1.20 | 1.40 | 1.00 |
| Course Wise -Direct Attainment | **1.67** | **1.99** | **2.33** | **1.35** | **1.33** | **0.98** | **1.18** | **0.83** |

**Sem VI (BATCH 2019—20)**

**Subject: Core Java**

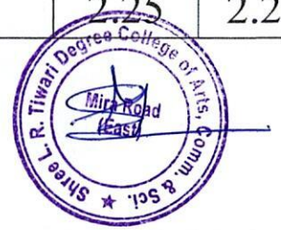
| Direct Assessment | PO-1 | PO-2 | PO-3 | PO-4 | PO-5 | PO-6 | PO-7 | PO-8 |
|---|---|---|---|---|---|---|---|---|
| Internal Examination | 3.00 | 2.00 | 2.00 | 1.33 | 1.00 | 1.50 | 0.00 | 1.33 |
| External Examination | 3.00 | 2.00 | 2.00 | 1.50 | 1.00 | 1.60 | 1.00 | 1.33 |
| Course Wise -Direct Attainment | **3.00** | **2.00** | **2.00** | **1.46** | **1.00** | **1.58** | **0.75** | **1.33** |

# AVERAGE COURSE OUTCOME ATTAINMENT

## Programme Name: B.Sc. (Information Technology)

## Batch:2018-19 to Batch 2020-21

| SEMESTER | SUBJECT NAME | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 |
|---|---|---|---|---|---|---|---|---|---|
| SEM I | Imperative Programming | 3.00 | 2.00 | 2.00 | 1.46 | 1.00 | 1.58 | 0.75 | 1.33 |
| | Digital Electronics | 3.00 | 1.60 | 2.00 | 1.50 | 1.00 | 1.60 | 1.00 | 1.33 |
| | Operating Systems | 2.00 | 1.33 | 1.33 | 1.05 | 0.91 | 1.05 | 0.67 | 0.81 |
| | Discrete Mathematics | 1.67 | 1.99 | 2.33 | 1.35 | 1.33 | 0.98 | 1.18 | 0.83 |
| | Communication Skills | 1.73 | 2.00 | 1.38 | 1.25 | 2.21 | 1.15 | 2.70 | 2.85 |
| SEM II | Object Oriented Programming | 3.00 | 2.00 | 2.00 | 1.46 | 1.00 | 1.58 | 0.75 | 1.33 |
| | Microprocessor Architecture | 2.56 | 2.41 | 2.37 | 1.45 | 1.54 | 1.38 | 0.92 | 0.92 |
| | Web Programming | 3.00 | 2.79 | 2.79 | 2.36 | 1.92 | 1.36 | 1.00 | 1.00 |
| | Numerical and Statistical Methods | 2.75 | 2.75 | 2.22 | 1.83 | 0.92 | 0.92 | 0.92 | 0.92 |
| | Green Computing | 2.75 | 2.75 | 1.83 | 1.45 | 1.64 | 1.64 | 1.49 | 1.45 |
| SEM III | Python Programming | 2.25 | 1.50 | 1.99 | 1.18 | 0.75 | 1.32 | 0.75 | 1.13 |
| | Data Structures | 2.25 | 2.00 | 1.83 | 1.34 | 1.21 | 0.96 | 0.75 | 0.75 |
| | Computer Networks | 2.25 | 1.71 | 1.92 | 1.50 | 1.21 | 1.40 | 0.75 | 0.75 |
| | Database Management System | 2.25 | 2.25 | 1.67 | 1.50 | 1.50 | 1.34 | 1.24 | 1.56 |
| | Applied Mathematics | 2.25 | 2.25 | 2.25 | 1.24 | 0.75 | 1.24 | 0.75 | 0.75 |



| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **SEM IV** | Core Java | 3.00 | 2.00 | 2.00 | 1.46 | 1.00 | 1.58 | 0.75 | 1.33 |
| | Introduction to Embedded System | 3.00 | 2.43 | 2.43 | 1.79 | 1.15 | 1.58 | 1.54 | 1.43 |
| | Computer Oriented Statistical Techniques | 3.00 | 2.80 | 2.40 | 1.60 | 1.60 | 1.20 | 1.20 | 1.40 |
| | Software Engineering | 3.00 | 2.75 | 2.75 | 1.00 | 1.67 | 2.50 | 1.00 | 1.00 |
| | Computer graphics and Animation | 3.00 | 2.73 | 2.30 | 1.58 | 1.70 | 1.28 | 1.15 | 1.36 |
| **SEM V** | Software Project Management | 3.00 | 1.67 | 1.79 | 1.43 | 1.00 | 1.50 | 1.43 | 1.64 |
| | Internet of Things | 3.00 | 2.00 | 2.00 | 1.46 | 1.00 | 1.58 | 0.75 | 1.33 |
| | Advanced Web Programming | 3.00 | 2.67 | 2.58 | 1.58 | 1.65 | 1.50 | 1.00 | 1.00 |
| | Artificial Intelligence | 3.00 | 2.00 | 2.49 | 1.58 | 1.00 | 2.00 | 1.00 | 1.64 |
| | Enterprise Java | 3.00 | 2.00 | 2.00 | 1.46 | 1.00 | 1.58 | 0.75 | 1.33 |
| **SEM VI** | Software Quality Assurance | 3.00 | 3.00 | 2.43 | 2.00 | 1.00 | 2.00 | 1.00 | 1.00 |
| | Security in Computing | 3.00 | 3.00 | 2.58 | 2.00 | 1.00 | 2.58 | 1.00 | 1.00 |
| | Business Intelligence | 3.00 | 2.63 | 2.79 | 1.79 | 1.00 | 2.00 | 1.00 | 1.58 |
| | Principal of Geographics Information | 3.00 | 2.43 | 2.00 | 1.54 | 2.00 | 1.43 | 1.00 | 1.00 |
| | IT service Management | 3.00 | 3.00 | 3.00 | 3.00 | 2.00 | 2.00 | 2.00 | 2.00 |
| **AVERAGE DIRECT ATTAINMENT** | | **2.72** | **2.28** | **2.18** | **1.57** | **1.29** | **1.53** | **1.07** | **1.26** |

# Programme Exit Survey

| Program Outcome Statements | | After Successful completion of the B.Sc. (Information Technology) program students will be able to: | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | **QUESTIONNAIRE** | | | | | | | | **ATTAINMENT LEVEL** |
| **PO1** | Computation Knowledge | To what extent do you apply mathematics, science, computing skills, and programming knowledge for conceptualizing computing models? | Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree | Total | Percentage Satisfied (%) | |
| | | **Number of Responses** | 5 | 5 | 10 | 18 | 20 | 58 | 83% | **3** |
| **PO2** | Formulation of Solution | How well can you renovate complex circumstances and contemporary issues into problems, examine, explore, understand, and propose cohesive solutions using the latest technologies? | Very Poor | Poor | Average | Good | Excellent | | | |
| | | **Number of Responses** | 5 | 10 | 10 | 13 | 20 | 58 | 74% | **2** |
| **PO3** | Problem Investigation | How effectively can you develop and conduct experiments, interpret data from results, and provide well-informed solutions? | Not Effective | Somewhat Effective | Moderately Effective | Very Effective | Highly Effective | | | |
| | | **Number of Responses** | 5 | 10 | 10 | 13 | 20 | 58 | 74% | **2** |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **PO4** | Emerging Technology Uses | How skilled are you in selecting modern computing tools, software, problem-solving skills, and techniques necessary for innovative software/hardware development? | Novice | Beginner | Intermediate | Advanced | Expert | | | |
| | | **Number of Responses** | 3 | 8 | 10 | 17 | 20 | 58 | 81% | **3** |
| **PO5** | Project Management | To what extent do you understand management and computing principles and use computing knowledge to manage projects in multidisciplinary environments? | Very Limited Understanding | Limited Understanding | Moderate Understanding | Strong Understanding | Very Strong Understanding | | | |
| | | **Number of Responses** | 4 | 4 | 13 | 19 | 18 | 58 | 86% | **3** |
| **PO6** | Innovation and Entrepreneurship | How well do you recognize opportunities, entrepreneurship vision, and use innovative ideas to create value and wealth for the betterment of the individual, society, and the nation? | Not At All | Slightly | Moderately | Very Well | Extremely Well | | | |
| | | **Number of Responses** | 2 | 5 | 12 | 15 | 24 | 58 | 88% | **3** |
| **PO7** | Communication Efficacy | How effectively can you communicate with working team members, | Very Ineffective | Ineffective | Neutral | Effective | Very Effective | | | |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | project managers, the computing community, and society by being able to comprehend effective documentation and presentations? | | | | | | | | |
| | | **Number of Responses** | 3 | 8 | 16 | 15 | 16 | 58 | 81% | **3** |
| **PO8** | Professional Ethics | . How well do you apply and commit to professional ethics and cyber regulations in a global economic environment? | Not at All | Slightly | Moderately | Very Well | Extremely Well | | | |
| | | **Number of Responses** | 5 | 8 | 12 | 10 | 23 | 58 | 84% | **3** |
| | | Recognize the need for and develop the ability to engage in continuous learning as a Computing professional? | Not at All | Slightly | Moderately | Very Well | Extremely Well | | | |
| | | **Number of Responses** | 3 | 2 | 8 | 20 | 25 | 58 | | |

| COURSE END SURVEY | ATTAINMENT LEVEL |
|---|---|
| *60-69.99 % of students agree with PO Attained* | **1** |
| *70-79.99% of students agree with PO Attained* | **2** |
| *80% and above of students agree with PO Attained* | **3** |

# Average Attainment level of CO_PO
# Programme Name: B.Sc. (Information Technology)
# Batch:2018-19 to Batch 2020-21

| Particulars / Programme Outcomes | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 |
|---|---|---|---|---|---|---|---|---|
| Direct Attainment | 2.72 | 2.28 | 2.18 | 1.57 | 1.29 | 1.53 | 1.07 | 1.26 |
| Indirect Attainment (Curriculum Feedback/ Program Exit Form) | 3.00 | 2.00 | 2.00 | 3.00 | 3.00 | 3.00 | 3.00 | 3.00 |
| Total = 80%*Direct Attainment+20%*Indirect Attainment | 2.78 | 2.23 | 2.15 | 1.86 | 1.63 | 1.82 | 1.46 | 1.61 |
| **Attainment in %** | **92.63** | **74.17** | **71.51** | **61.95** | **54.36** | **60.72** | **48.61** | **53.56** |

# Gap Analysis and Action Taken Report on PO CO Attainment

| Professional Skills | Current State | Recommendations |
|---|---|---|
| **Practical Experience** | - Limited hands-on experience in real-world scenarios. | - Engage in internships or practical projects to gain hands-on experience. |
| | - Lack of exposure to industry-specific challenges. | - Seek mentorship opportunities to learn from experienced professionals. |
| **Leadership and Management Skills** | - Adequate knowledge but limited practical application. | - Take on leadership roles in projects or team initiatives. |
| | - Insufficient experience in leading teams or projects. | - Attend leadership development programs or workshops. |
| **Ability to Work on Own Initiative** | - Overreliance on instructions and lack of proactive approach. | - Set personal goals and deadlines to develop a proactive mindset. |
| | - Limited experience in taking ownership of tasks. | - Engage in projects that require independent decision-making. |
| **Communication Skills** | - Effective communication in familiar environments. | - Participate in public speaking events or workshops. |
| | - Challenges in adapting communication style to diverse audiences. | - Seek feedback and practice adapting communication style. |
| **Technical Expertise** | - Strong theoretical knowledge but gaps in practical implementation. | - Attend workshops and conferences to stay updated on industry trends. |
| | - Limited exposure to the latest industry trends and technologies. | - Participate in practical, hands-on projects to apply technical knowledge. |
| **Ability to Work Across Interdisciplinary Teams** | - Limited experience in collaborating with professionals from diverse backgrounds. | - Join cross-functional teams or projects to diversify experiences. |
| | - Difficulty in integrating skills from different disciplines. | - Enhance understanding of different disciplines through self-learning. |
| **Numerical Skills** | - Proficient in basic numerical tasks but lacking advanced skills. | - Enroll in advanced courses or workshops for numerical skill improvement. |
| **Teamwork** | - Collaborates well but may face challenges in diverse team dynamics. | - Join group activities or workshops focused on teamwork and collaboration. |
| | - Requires further enhancement in group problem-solving skills. | - Seek opportunities to work with diverse teams. |
| **Soft Skills** | - Basic understanding of personality development. | - Engage in personality development programs or workshops. |
| | - Limited exposure to stress management and overall well-being practices. | - Incorporate stress management practices into daily routine. |