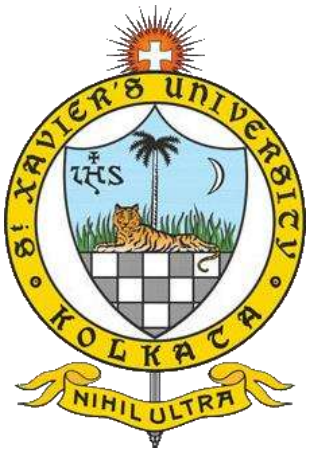

Syllabus of
B.Sc. (Hons.) in Statistics and Data Science

Department of Statistics

Faculty of Science

St. Xavier's University, Kolkata

w.e.f A.Y. 2025-2026

B.Sc. (Hons.) in Statistics and Data Science

[Updated up to Semester I and Semester II]

Total Credit: 160

Semester wise details

Semester-I							
Number of Papers: 6							
Course Code	**Course Title**	**Course Type**	**Credits in each course**				
			Theory	**Practical**	**Tutorial**	**Credits**	**Total Marks**
BSDCCR1 111C	Descriptive Statistics and Probability- I	Major	3	1	0	4	30(CIA) + 45(T) + 25(P)
BSDMER 121C	Programming in C/C++	Minor	2	2	0	4	30(CIA) + 20(T) + 50(P)
Any one of the following two multidisciplinary courses							
BECMIR1 31T	Introduction to Economic Theory	Multi-Disciplinary	3	0	0	3	30(CIA) +70(T)
	Cyber Law and IPR	Multi-Disciplinary	3	0	0	3	30(CIA) +70(T)
BENAER 141T	Communicative English-I	Ability Enhancement	2	0	0	2	15(CIA) + 35(T)
BGCSER1 51T	Personality Development	Skill Enhancement	3	0	0	3	30(CIA) + 70(T)
Following two common value-added courses are compulsory							
BGCVAR 161T	Interreligious Studies for global citizenship	Common Value-Added	2	0	0	2	15(CIA) + 35(T)
BGCVAR 171T	Environmental Education	Common Value-Added	2	0	0	2	25(CIA) + 25(T)
Total						**20**	

Semester-II							
Number of Papers : 5							
Course Code	**Course Title**	**Course Type**	**Credits in each course**				
			Theory	**Practical**	**Tutorial**	**Credits**	**Total Marks**
	Descriptive Statistics and Probability-II	Major	3	1	0	4	30(CIA) + 45(T) + 25(P)
	Data Structure and Algorithms using C/C++	Minor	2	2	0	4	30(CIA) + 20(T) + 50(P)
Any one of the following two multidisciplinary courses							
	Development Studies	Multi-Disciplinary	3	0	0	3	30(CIA)+ 70(T)
	Principles of Management	Multi-Disciplinary	3	0	0	3	30(CIA)+ 70(T)
	Communicative English-II	Ability Enhancement	2	0	0	2	15(CIA) + 35(T)
	Spreadsheet and SPSS in Practice	Skill Enhancement	0	0	3	3	30(CIA)+ 70(P)
Following two common value-added courses are compulsory							
	Service Learning	Common Value-Added	1	1	0	2	25(T) +25(P)
	Understanding the Indian Constitution	Common Value-Added	2	0	0	2	15(CIA) + 35(T)
Total						**20**	

[For the Four-Year Credit Framework: https://www.sxuk.edu.in/statistics_programes]

Program Outcomes

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 centered 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 socio-technological changes.

SEMESTER-I

Course Name: Descriptive Statistics and Probability- I.

Course Type: Discipline Specific Core.

Credit: 4 [Lecture: 3, Practical: 1].

Course Outcomes (CO):

CO1: Familiarize students with collection and presentation of data, use of charts, plots and tables.
CO2: Understanding the measures of central tendency and applying them in practice.
CO3: Understanding the measures of dispersion, measures of skewness and kurtosis and applying them in practice.
CO4: Working with bivariate datasets, applying correlation and regression in practice.
CO5: Develop students' ability to solve combinatorial problems and solve basic problems of probability.

COURSE CONTENT

Module No.	Module Name	Chapter Topic	CO
I	Dataset and its Presentation	Concept of population and sample, Different sources and types of data, Variable and attribute, scales of measurement, Examples of real-life datasets. Frequency distributions, Line chart, Bar diagram, Pie chart, Multiple bar diagram, Leaf and Stem plot, Histogram, Ogive. Frequency polygon, Boxplot and other relevant plots.	CO1
II	Univariate and Bivariate Data	Features of univariate data: Measures of central tendency, Measures of dispersion, Quantiles, Moments, Measures of skewness and kurtosis. Bivariate data: Definition and examples, Scatter plot, Bivariate frequency distribution, Product-moment correlation coefficient and its interpretation, Notion of spurious correlation, Simple linear regression.	CO1, CO2, CO3, CO4
III	Counting and Probability	Introduction, Random experiments, Sample space, Events, Mutually exclusive events, Exhaustive events, Independent events. Definitions of Probability – Classical, Statistical and Axiomatic. Application: Derivation of the probability of at least one event out of n events, n (>1) being finite. Statement of the probabilities of at least m and exactly m out of n events, n (>m) being finite and other examples. Bonferroni inequality, Boole's inequality. The concept of Conditional Probability, theorem of total probability, Bayes theorem and its applications.	CO5

IV	Random Variable and Joint Distribution	Random Variables – discrete and continuous. Concept of the probability distribution of a random variable. Probability Mass and Density functions. Cumulative distribution function (CDF) and the statement of properties of CDF. Illustrations in both discrete and continuous situations. Expectation of random variables, Moments and quantiles. Measures of Central tendency/ Dispersion/ Skewness/ Kurtosis. Discrete and continuous joint distributions. Bivariate probability mass and density functions. Cumulative distributions function (CDF) and properties (statements only). Marginal and conditional distributions. Independence of two random variables. Correlation and Simple Linear Regression.	CO5

Suggested Readings:

Text Books:

1. Goon A.M., Gupta M.K. and Dasgupta B. (2002): *Fundamentals of Statistics, Vol. I*, 8th Edn. The World Press, Kolkata.

2. Rohatgi, V.K. and Saleh, A.K. Md. E. (2015). *An Introduction to Probability and Statistics (3rd Edition)*, Wiley Series in Probability and Statistics, India.

Reference Books:

1. Yule G.U. and Kendall M.G (1994) : *An Introduction to the Theory of Statistics*. 14th Edn. Universal Book stall, Delhi.

2. Hogg, R.V., Tanis, E.A. and Rao J.M. (2009): *Probability and Statistical Inference, Seventh E*d, Pearson Education, New Delhi.

3. Miller, Irwin and Miller, Marylees (2006)*: John E. Freund's Mathematical Statistics with Applications*, (7th Edn.), Pearson Education, Asia.

4. Myer, P.L. (1970): *Introductory Probability and Statistical Applications*, Oxford & IBH Publishing, New Delhi .

5. Ross, S.M. (2014): *A First Course in Probability*, 9th Edn. Pearson, USA.

6. Chung, K.L. (1974): *Elementary Probability Theory with Stochastic Processes*, 3rd Edn. Springer, USA.

7. Goon A.M., Gupta M.K. and Dasgupta B. (2002): *Outline of Statistical Theory, Vol. I*. The World Press, Kolkata.

8. Feller, William. *An Introduction to Probability Theory and Its Applications*. Vol. 1, 3rd ed., John Wiley & Sons, 1968.

9. Uspensky, J. V. *Introduction to Mathematical Probability*. McGraw-Hill, 1937.

10. Parzen, Emmanuel. *Modern Probability Theory and Its Applications*. John Wiley & Sons, 1960.

List of Practicals:

1. Organize a given dataset into a frequency distribution table.
2. Graphical/diagrammatic representation of data.
3. Calculate summary measures such as the mean, median, mode, quantiles, variance, standard deviation, coefficient of variation, etc. for a given dataset. Interpret the results in context.
4. Create a scatter plot for a given bivariate dataset and interpret patterns. Compute the Pearson correlation coefficient and discuss its strength and direction.
5. Fitting of a simple linear regression model. Interpret the slope and intercept in the context of the data. Predict values based on the regression equation and discuss possible spurious correlations.

Teaching Pedagogy:

S. No.	**Description**	**Used (Yes/No)**
1	Lecture	Yes
2	Discussion/Demonstration	Yes
3	Case Study	Yes
4	Test/Assignment	Yes
5	Student Seminars/Presentation	Yes

CO-PO mapping:

CO/PO	PO1 (Critical Thinking)	PO2 (Effective Communication)	PO3 (Social Interaction)	PO4 (Effective Citizenship)	PO5 (Ethics)	PO6 (Environment and Sustainability)	PO7 (Self-directed and Life-long Learning)
CO1	L	H	H	M			M
CO2	H	M	M				H
CO3	H	M	M				H
CO4	H	M	M				H
CO5	H						H
Avg.	2.6	1.8	1.8	0.4	0	0	2.8

*** **H** means High relevance, **M** means medium relevance, **L** means Low relevance

SEMESTER-I

Course Name: Programming in C/C++.

Course Type: Minor.

Credit: 4 [Lecture: 2, Practical: 2].

Course Outcomes (CO):

CO1: Understanding the fundamental concepts of C programming.
CO2: Develop student's ability to design, implement and debug C programs.
CO3: Familiarize students with essential programming constructs such as variables, control statements and functions.
CO4: Develop students' ability to apply programming skills to compute basic statistical measures.
CO5: Familiarize students with simulation experiments.

COURSE CONTENT

Module No.	Module Name	Chapter Topic	CO
I	Introduction	Overview of C language, Basic Structure, Header Files, Character sets, Keywords, Identifiers, Constants, Variables, Data types (Data types – primitive and non-primitive). Arithmetic, Relational, Logical and Assignment; Increment, Decrement and Conditional, Operator Precedence and Associativity; Expressions, Expression evaluation and type conversion, casts, Formatted input and output. Assignment, Initialization, Decision making, looping and control structure	CO1,CO2
II	Array, String and String handling function, Pointers, Functions, Derived Data Types (Structures and Unions)	One-Dimensional Arrays and Initialization, Two-Dimensional Arrays and Initialization, Accessing array elements. String declaration, Initialization and accessing, Array of Strings, String functions. Declaration and initialization of pointer, accessing variables through pointer, Problems with Pointers. General form of a Function, Function Declaration and Definition, Function Arguments (Call by Value and Call by Reference), Arguments to main() (argc and argv), Returning from a Function, Functions Returning Values and their types, Function Returning Pointers, Functions of Type void, Declaring Variable-Length Parameter Lists, Passing pointer to function, Passing One-Dimensional Arrays to Functions, Passing Two-Dimensional Arrays to Functions, Recursion, Library Functions. Basics of Structures, Accessing Structure Members, Array of Structures, Pointers to Structures, Unions, typedef.	CO2,CO3
III	Descriptive Statistics	Writing C programs to compute measures of central tendency (Mean, trimmed means, median, mode), Quantiles, Measures of dispersion (Range, standard deviation, mean absolute deviation, coefficient of variation), Gini's index. Creating frequency tables. Computing product-moment correlation coefficient. Fitting simple linear regression equation. Real data analysis and interpretation	CO4
IV	Probability	C programs to compute factorials, binomial coefficients. Pseudo-random number generation. Simulation of random experiments to compute probability of an event using the relative frequency	CO5

		approach: Problems related to coin toss, dice rolls etc. Problems on conditional probability and Bayes' Theorem.	

Suggested Readings:

Text Books:

1. B. S. Gottfried. Programming in C (Schaum's Series).
2. Balaguruswami. Programming in ANSI C- E (TMH).

Reference Books:

1. B. W. Kernighan and D. M. Ritchie. The C Programming Language (PHI).
2. H. Schildt. C Made Easy (McGraw-Hill).
3. Pradip Dey and Manas Ghosh. Computer Fundamentals and Programming in C, Second Edition (Oxford University Press).
4. Ajay Mittal. Programming in C: A Practical Approach (Pearson Publication).
5. Sheldon M. Ross. Simulation, Fifth Edition (Academic Press Inc).

Teaching Pedagogy:

S. No.	**Description**	**Used (Yes/No)**
1	Lecture	Yes
2	Discussion/Demonstration	Yes
3	Case Study	Yes
4	Test/Assignment	Yes
5	Student Seminars/Presentation	Yes

CO-PO mapping:

CO/PO	PO1 (Critical Thinking)	PO2 (Effective Communication)	PO3 (Social Interaction)	PO4 (Effective Citizenship)	PO5 (Ethics)	PO6 (Environment and Sustainability)	PO7 (Self-directed and Life-long Learning)
CO1	H	H			M		H
CO2	H	H			M		H
CO3	H	H			M		H
CO4	H	H	M	L			H
CO5	H	H	M	L			H
Avg.	3	3	0.8	0.4	1.2	0	3

*** **H** means High relevance, **M** means medium relevance, **L** means Low relevance

SEMESTER-I

Course Name: Introduction to Economic Theory.

Course Type: Multi-Disciplinary Course.

Credit: 3 [Lecture: 3]

Course Outcomes (CO):
CO1: The students will be able to recognize the basic theories of how individuals and firms interact within markets.
CO2: The students will be able to understand and analyse the broad macroeconomic issues in a structured manner.
CO3: The students will be able to understand the fundamental theories and challenges of an open economy.
CO4: The students will be equipped with the tools to analyse the practical economic issues both at the domestic and the international level.
CO5: The students will be able to evaluate and apply economic models and concepts to real-world policy problems, assessing their implications for both public and private decision-making.

Course Content:

Module No.	Module Name	Chapter Topic	CO
I	Microeconomic Foundations	How Market Works; Concept of Elasticity; Consumer and Producer Behaviour; Market Structure	CO1, CO4
II	Macroeconomic Foundations	National Income Accounting; Theories of Income Determination; Aggregate Demand and Aggregate Supply; Inflation and Unemployment	CO2, CO4
III	Foundations of International Economics	Comparative Advantage and Gains from Trade; Balance of Payments; Exchange Rate; Fiscal and Monetary Policy in an Open Economy	CO3, CO4, CO5

Suggested Readings:
Hubbard, G., Garnett, A., & Lewis, P. (2019). Essentials of Economics, 5th edition, Pearson Higher Education AU
Lipsey, R. G., & Chrystal, K. A. (2015). Economics, 13th Edition, OUP
Mankiw, N.G. (2016). Macroeconomics, (9th ed.). Worth Publishers. New York.
Samuelson, P., & Nordhaus, W. (2009). Economics. McGraw Hill.
Sloman, J., & Garratt, D. (2016). Essentials of Economics, 7th edition, Pearson

Teaching Pedagogy:

S. No.	Description	Used (Yes/No)
1	Lecture	Yes
2	Discussion/Demonstration	Yes
3	Case Study	Yes
4	Test/Assignment	Yes
5	Student Seminars/Presentation	Yes

CO-PO mapping:

CO/PO	PO1 (Critical Thinking)	PO2 (Effective Communication)	PO3 (Social Interaction)	PO4 (Effective Citizenship)	PO5 (Ethics)	PO6 (Environment and Sustainability)	PO7 (Self-directed and Life-long Learning)
CO1	M	M	H	M			M
CO2	M	M		M			M
CO3	M	M		M			M
CO4	H	H	M	L			H
CO5	H	M					H
Avg.	2.4	2.2	1	1.4	0	0	2.4

*** **H** means High relevance, **M** means medium relevance, **L** means Low relevance

SEMESTER-I

Course Name: Cyber Law and IPR.

Course Type: Multi-Disciplinary Course.

Credit: 3 [Lecture: 3].

Course Outcomes (CO):

CO1: Remembering the preliminary techniques involved with the computer system providing communications and its multiple applications in contemporary society.
CO2: Understanding role of electronic means of communications in the formation of the contracts and its global acceptance, and generation of information and filing to the government's agencies.
CO3: Analyzing legal aspects of e-contracts, E-signatures, and Statutory authorities in India and modifications in Banking and Penal and Procedural laws.
CO4: Examining issues and challenges pose by the cyberspace to the contemporary society, defining rights, contraventions and their enforcement mechanisms.
CO5: Appraising the legal aspects of intellectual property rights creation and its modification in contemporary society.

COURSE CONTENT

Module No.	Module Name	Chapter Topic	CO
I	Fundamentals of Cyber Space and Cyber Law	Computer and Cyberspace applications in society, An alternative to paper-based communications, Data and Privacy, E-commerce - Signature- Records, Development of Cyber law in India, Objectives, Cybercrimes, Intellectual Property, E-governance	CO1
II	E-commerce and Digital Signature	UNCITRAL Model Law on E-commerce and Signature Formation of contracts, signature, records, E-commerce, Types, Legal aspects of E-commerce, Digital Signature and Multiple applications of E-records in E-taxation, banking and payment, Document Filing with Govt. Agencies, Controller and Certifying Authority	CO2, CO3 & CO4

III	Penalties, Compensation and Adjudication of Cyber Crimes	Traditional Crimes and Cybercrime, Computer related offences, Issues with the Jurisdictions, Phishing, Cyber theft, Cyber Stalking, Cyber Terrorism, Obscenity and Child Pornography in Cyberspace, Adjudicating Office and Cyber Appellate Tribunal, Admissibility of E-evidence	CO3 & CO4
IV	Intellectual Property and Cyber Law	Meaning, Nature and Concept of Intellectual Property Rights, Creation and Protection of Copyright, Domain Name, Copyright in the Digital Medium, Computer Programmes, Copyright and WIPO Treaties and Trademark in cyberspace, Jurisdiction in Trademark Disputes,	CO5

Suggested Readings

1. Vakul Sharma, Information Technology- Law and Practice, Universal Law Publishing Co., 2019
2. Justice Yatindra Singh, Cyber Laws, Universal Law Publishing Co, New Delhi, (2012).
3. Verma S, K, Mittal Raman, Legal Dimensions of Cyber Space, Indian Law Institute, New Delhi, (2004).
4. Pavan Duggal, Cyber Law- An exhaustive section wise Commentary on the Information Technology Act along with Rules, Regulations, Policies, Notifications etc., Universal Law Publishing, 2017.
5. S. R. Bhansali, Information Technology Act, 2000, University Book House Pvt. Ltd., Jaipur (2003).
6. Nandan Kamath, Law relating to Computers Internet and E-commerce, Universal Law Publishing Company, 2016
7. The Information Technology Act, 2002 and Rules
8. Apar Gupta , Commentary on Information Technology Act– With Rules, Regulations, Orders, Guidelines, Reports And Policy Documents, Lexis Nexis , 2015.

Web Links:

< https://cca.gov.in/about.html >

< https://www.mca.gov.in/MinistryV2/certifyingauthorities.html >

Teaching Pedagogy:

S. No.	Description	Used (Yes/No)
1	Lecture	Yes
2	Discussion/Demonstration	Yes
3	Case Study	Yes
4	Test/Assignment	Yes
5	Student Seminars/Presentation	Yes

CO-PO mapping:

CO/PO	PO1 (Critical Thinking)	PO2 (Effective Communication)	PO3 (Social Interaction)	PO4 (Effective Citizenship)	PO5 (Ethics)	PO6 (Environment and Sustainability)	PO7 (Self-directed and Life-long Learning)
CO1		H	M	H	M		M
CO2	M	H	M	H	M		M
CO3	M				M		M
CO4	H	H	H	H	M		M
CO5	H	M	M		M		M
Avg.	2	2.2	1.8	1.8	2	0	2

*** **H** means High relevance, **M** means medium relevance, **L** means Low relevance

SEMESTER-I

Course Name: Communicative English I.

Course Type: Ability Enhancement Course.
Credit: 2 [Lecture: 2].

Course Outcomes (CO):

CO1: To make the students understand communicative competence. To demonstrate his/her verbal and non-verbal communication ability.
CO2: To make the students analyze and conduct independent surveys, collect data, prepare and present reports and projects.
CO3: To apply effective business correspondence with brevity and clarity. Learn the process of acquiring a job with special reference to prepare a resume.
CO4: To evaluate the process of writing error free while making an optimum use of vocabulary & grammar leading to lifelong learning
CO5: To create and enhance employability and prepare students for the challenges they face while communicating in English in any workspace.

COURSE CONTENT

Module No.	Module Name	Chapter Topic	CO
I	Theory & Grammar	Theory of Communication: Fundamentals, Process of Communication, Types of Communication, Mis-communication, Skills Required for Effective Communication Accurate Grammatical Usage: Sentence Structure, Verbs (Classification), Infinitive & Gerund, Tense, Voice, Phrasal Verbs & Idioms, Punctuation marks.	CO1
II	English Composition	Composition: Reflective, Descriptive, Narrative, Argumentative Summarising Précis Article Writing Blog Writing Documenting and Note-Making	CO2, CO3 & CO4
III	Speaking	Personal Interview, Mock Interview Public Speaking, Presentations	CO3 & CO4

Suggested Readings

1. Fluency in English - Part II, Oxford University Press, 2006.
2. Business English, Pearson, 2008.
3. Language, Literature and Creativity, Orient Blackswan, 2013.
4. A Practical English Grammar, A.J. Thomson, A.V. Martinet, Oxford University Press
5. A Handbook of English Grammar and Usage, D. Thakur, Bharati Bhawan Publication
6. Function in English- Jon Blundell et al, OUP
7. Oxford Practice Grammar, John Eastwood, Oxford University Press

Teaching Pedagogy:

S. No.	Description	Used (Yes/No)
1	Lecture	Yes
2	Discussion/Demonstration	Yes
3	Case Study	Yes
4	Test/Assignment	Yes
5	Student Seminars/Presentation	Yes

CO-PO mapping:

CO/PO	PO1 (Critical Thinking)	PO2 (Effective Communication)	PO3 (Social Interaction)	PO4 (Effective Citizenship)	PO5 (Ethics)	PO6 (Environment and Sustainability)	PO7 (Self-directed and Life-long Learning)
CO1	H	H					
CO2		H	H				
CO3							H
CO4		M	H				H
CO5				L			H
Avg.	0.6	1.6	1.2	0.2			1.8

*** **H** means High relevance, **M** means medium relevance, **L** means Low relevance

SEMESTER-I

Course Name: Personality Development.

Course Type: Skill Enhancement Course.

Credit: 3 [Lecture: 3].

Course Outcomes (CO):

CO1: Identify strengths, weaknesses, opportunities and challenges related to their personal capabilities for effectively managing conflict and stress.
CO2: Understand life skills as a perfect blend of knowledge and behavior, attitudes and work ethics to respond effectively to demands and challenges of daily life.
CO3: Apply group dynamic techniques in the context of organizational culture to gain a deeper understanding of how to make team building more pro-active and efficient.
CO4: Evaluate inter-personal relations and analyze the barriers to effective communication.
CO5 Develop a leadership style that is uniquely theirs by effectively using their soft skills.

COURSE CONTENT

Module No.	Module Name	Chapter Topic	CO
I	Personality & Personality Development: Fundamentals	Define Personality & Why Personality Development? Determinants of Personality Development Types of Personality (including activities)	CO1
II	Self-Management	Motivation Conflict Management Time Management Stress Management (including activities)	CO1, CO2
III	Social Skill Development	Inter-personal Relations & Communication Group Dynamics Team Building Leadership Holistic Well-being (including activities)	CO3, CO4, CO5

Suggested Readings

1. Mukherjee, S. (2021). *Personality Development Studies for Leadership: Foundation Course*. St. Xavier's University, Kolkata (1st ed.).
2. Agarwal, R. & Tandon, A. (2012). *Personality Development & Leadership*. Oxford Book Company (1st ed.).
3. Mitra, B. K. (2016). *Personality Development And Soft Skills*. Oxford University Press, India (2nd ed.).

Additional Readings

1. Hurlock, E. B. (2017). *Personality Development.* Tata McGraw Hill, New Delhi (Indian Edition).
2. Onkar, R. M. (2014). *Personality Development and Career Management: A Pragmatic Perspective*.
3. S. Chand Publishing, New Delhi (3rd revised ed.).
4. Gallagher, K. (2010). *Skills Development*. Oxford University Press, India (Indian Edition).
5. Mangal, S.K. (2018). *Educational Psychology*. Tondon Publications, Ludhiana.
6. Morgan, C. & King, R. (2017). *Introduction To Psychology*. McGraw Hill Education - 7th ed. (Indian Edition).

Teaching Pedagogy:

S. No.	Description	Used (Yes/No)
1	Lecture	Yes
2	Discussion/Demonstration	Yes
3	Case Study	Yes
4	Test/Assignment	Yes
5	Student Seminars/Presentation	Yes

CO-PO mapping:

CO/PO	PO1 (Critical Thinking)	PO2 (Effective Communication)	PO3 (Social Interaction)	PO4 (Effective Citizenship)	PO5 (Ethics)	PO6 (Environment and Sustainability)	PO7 (Self-directed and Life-long Learning)
CO1	M		M		H		H
CO2	H	M	H	M	H	M	H
CO3	H	H	H	M	H		M
CO4		H	H	M	M		H
CO5	H	H	H	H	H	H	H
Avg.	2.2	2.2	2.8	1.8	2.8	1	2.8

*** **H** means High relevance, **M** means medium relevance, **L** means Low relevance

SEMESTER-I

Course Name: Interreligious Studies for Global Citizenship.

Course Type: Common Value-Added Course.
Credit: 2 [Lecture: 2].

Course Outcomes (CO):

CO1: Identify the value system in different religions and understand their basic philosophy required for global citizenship.
CO2: Understand the meaning of spirituality.
CO3: Analyze the morals and ethics in different religious scriptures and learn from the life stories of Gurus, Mystics, Saints and Philosophers.
CO4: Explain the need for inter-religious dialogue and apply the same in relation to social change.
CO5 Develop an attitude of care and empathy for all and the environment.

COURSE CONTENT

Module No.	Module Name	Chapter Topic	CO
I	Academic Study of Religion	Religion, a Global Human Activity Religion in Indian Education System Essentials of Religion and Spirituality	CO1, CO2
II	The Global Religious Landscape	Hinduism Islam Christianity Buddhism Jainsim Sikhism Zoroastrianism	CO1, CO2, CO3
III	Religious Pluralism and Dialogue	Rationale for Global Spread of Religious Diversity The Importance of Inter- religious Dialogue for Global Citizenship Different Kinds of Dialogue	CO4
IV	Reflections		CO5

Suggested Readings

1. Romus, D. John (2023). *Religious Studies for Global Citizenship: Foundation Course*, St. Xavier's University, Kolkata.
2. Kassam, M. (Ed.). (2017). *The Religions of India : A Microcosm of World Religions.* Manohar Publications, India.
3. Gaus, R. (2021). Global (Citizenship) Education as inclusive and diversity learning in Religious Education. *Journal of Religious Education*, *69*(2), 179-192.
4. Alles D., Gregory (2010). *Religious Studies: A Global View*. Routledge, UK (1st ed.).
5. Dalal, R. (2014). *The Religions of India: A Concise Guide to Nine Major Faiths*. Penguin, India.
6. Cavallin, C., Sander, Å., Sitharaman, S. (2020). *The Future of Religious Studies in India*. Routledge, India (1st ed.).
7. Raj S.J., J. Felix (2022). *Tides: Story Bank.* St. Xavier's University Kolkata Alumni Association,
8. Kolkata.
9. Raj S.J., J. Felix (2020). *Waves: Story Bank.* St. Xavier's University Kolkata Alumni Association, Kolkata.

Teaching Pedagogy:

S. No.	**Description**	**Used (Yes/No)**
1	Lecture	Yes
2	Discussion/Demonstration	Yes
3	Case Study	Yes
4	Test/Assignment	Yes
5	Student Seminars/Presentation	Yes

CO-PO mapping:

CO/PO	PO1 (Critical Thinking)	PO2 (Effective Communication)	PO3 (Social Interaction)	PO4 (Effective Citizenship)	PO5 (Ethics)	PO6 (Environment and Sustainability)	PO7 (Self-directed and Life-long Learning)
CO1	M		H	H	H		H
CO2	H		H	H			H
CO3	M		H	H	H		H
CO4	M	M	H	H			H
CO5			H	H	M	H	H
Avg.	1.8	0.4	3	3	1.6	0.6	3

*** **H** means High relevance, **M** means medium relevance, **L** means Low relevance

SEMESTER-I

Course Name: Environmental Education.

Course Type: Common Value-Added Course.

Credit: 2 [Lecture: 2].

Course Outcomes (CO):

CO1: Recognize the historical context of human interactions with the environment and resources that sustain life and govern economy.
CO2: Understand the concept of natural resources; identify types of natural resources, their distribution and use with special reference to India. Also to understand the major international institutions and programmes and the role played by them in the protection and preservation of the environment.
CO3: Analyze the morals and ethics in different religious scriptures and learn from the life stories of Gurus, Mystics, Saints and Philosophers.
CO4: Determine the root cause of various pollution, its impact on human health and the consequences of species extinction.
CO5 Support sustainability as a practice in life, society, and industry.

COURSE CONTENT

Module No.	Module Name	Chapter Topic	CO
I	Humans and the Environment	1.1 Multidisciplinary nature of environmental studies; Scope and importance of Environment study 1.2 The man-environment interaction: Humans as hunter-gatherers; Origin of agriculture; Emergence of city-states; Great ancient civilizations and the environment; Industrial revolution and its impact on the environment 1.3 Human population growth: Impacts on environment and its control; Global Environment change (Major Reason) 1.4 The emergence of environmentalism: Anthropocentric and eco-centric perspectives (Brief idea) UN Conference on Human Environment 1972; The Club of Rome- Limits to Growth; Rio Summit	CO1

II	Natural Resources, Local, Regional and Global Environmental Issues and Sustainable development	2.1 Definition and classification of resource 2.2 Biotic Resources: Forest, Grassland, Desert, Aquatic ecosystems; Status and challenges 2.3 Water: Use and over-exploitation of surface and ground water, Environmental impact Conflicts over water Water conservation 2.4 Minerals: Important minerals; Mineral exploitation; Environmental problems due to extraction of minerals 2.5 Energy resource: Renewable (Cochin Airport, Muppandal Wind Park) and non-renewable energy sources; Implications of energy use on the environment 2.6 Land use and Land cover change: Land degradation, soil erosion, deforestation, desertification and urbanization. 2.7 Global change: Global warming, Ozone layer depletion, Acid rain and Photo-chemical smog 2.8 Introduction to sustainable development: World Commission on Environment and Development and Concept of Sustainable development, Sustainable Development Goals (SDGs)- targets and indicators, challenges and strategies for SDGs	CO1, CO5 CO1 CO2, CO3, CO4
III	Biodiversity Conservation and Ecosystem	3.1 Ecosystems and ecosystem services: Structure and function of ecosystem; Energy flow in an ecosystem; Food chains and food webs, Ecological Pyramid, Succession and Interaction; Ecosystem values: ecological, economical, social, ethical, aesthetic values 3.2 Biodiversity and its distribution: Levels and types of biodiversity; Biodiversity hotspots; Threats to biodiversity and ecosystems Conservation of biodiversity: *In-situ* and *Ex-situ* conservation; Major protected areas; National and International Instruments for biodiversity conservation; the role of traditional knowledge, community-based conservation	CO2

IV	Environmental pollution and Climate Change Impacts, Adaptation, Mitigation and public health	4.1 Understanding pollution: Production processes and generation of wastes; Assimilative capacity of the environment; Point sources and non-point sources of pollution. 4.2 Air pollution: Indoor air pollution; Adverse health impacts of air pollutants; National Ambient Air Quality Standards. 4.3Water pollution: Sources of water pollution Water quality parameters and standards; adverse health impacts of water pollution on human and aquatic life. 4.4 Soil pollution and solid waste 4.5 Noise pollution: Noise standards; adverse impacts of noise on human health. 4.6 Pollution Disaster: Bhopal Gas Tragedy, Minamata Disease 4.7 Understanding climate change: Natural variations in climate; Causes and Impacts of Climate change • 4.8 Mitigation of climate change: carbon neutrality;	CO2, CO4
	Environmental Treaties and Management	5.1 Major International Environmental Agreements: Convention on Biological Diversity (CBD); Convention on International Trade in Endangered Species of Wild Flora and Fauna (CITES); Ramsar Convention on Wetlands of International Importance 5.2 Environmental legislation in India (Brief Idea): Wildlife Protection Act (1972), Water (Prevention and control of Pollution) Act (1974), Forest Conservation Act (1980), Air (Prevention & Control of Pollution) Act (1981), Environment Protection Act (1986) • 5.3 Practices- Earth Hour; EIA (advantages, and disadvantages)	CO2

Suggested Readings

1. Basu, M. and Xavier, S., *Fundamentals of Environmental Studies*, Cambridge University Press, 2016.

2. Mitra, A. K and Chakraborty, R., *Introduction to Environmental Studies*, Book Syndicate, 2016.

3. Fisher, M. H., *An Environmental History of India- From Earliest Times to the Twenty-First Century*, Cambridge University Press, 2018.

4. Gadgil, M., and Guha, R., *This Fissured Land: An Ecological History of India*. Univ. of California Press, 1993.

5. Gleeson, B. and Low, N. (eds.), *Global Ethics and Environment*, London, Routledge, 1999.

6. Harris, F. Global Environmental Issues, 2nd Edition. Wiley- Blackwell, 2012.

7. Bawa, K.S., Oomen, M.A. and Primack, R., *Conservation Biology: A Primer for South Asia*. Universities Press, 2011.

8. Krishnamurthy, K.V., *Textbook of Biodiversity*, Science Publishers, Plymouth, UK, 2003.

9. Ahluwalia, V. K., *Environmental Pollution, and Health*. The Energy and Resources Institute (TERI), 2015.

Teaching Pedagogy:

S. No.	Description	Used (Yes/No)
1	Lecture	Yes
2	Discussion/Demonstration	Yes
3	Case Study	Yes
4	Test/Assignment	Yes
5	Student Seminars/Presentation	Yes

CO-PO mapping:

CO/PO	PO1 (Critical Thinking)	PO2 (Effective Communication)	PO3 (Social Interaction)	PO4 (Effective Citizenship)	PO5 (Ethics)	PO6 (Environment and Sustainability)	PO7 (Self-directed and Life-long Learning)
CO1						M	
CO2						M	
CO3						M	
CO4						M	
CO5						M	L
Avg.						2	0.2

*** **H** means High relevance, **M** means medium relevance, **L** means Low relevance

SEMESTER-II

Course Name: Descriptive Statistics and Probability- II.

Course Type: Discipline Specific Core.

Credit: 4 [Lecture: 3, Practical: 1].

Course Outcomes (CO):
CO1: To aware about the foundational concepts of bivariate data analysis
CO2: To make the students acquainted with the foundational concepts of probability theory, laws and theorems.
CO3: Computing and interpreting expectations, moments, and generating functions
CO4: To identify and utilize different types of random variables and their distributions
CO5: To apply knowledge of standard probability distributions in real-world scenarios.

COURSE CONTENT:

Module No.	Module Name	Chapter Topic	CO
I	Descriptive Statistics II	Bivariate and multivariate data, Curve fittings and orthogonal polynomials, correlation ratio, correlation index, intraclass correlation, rank correlation: Spearman's and Kendall's measures. Multiple and partial correlation and regression.	CO1, CO2,CO3
II	Analysis of categorical data	Contingency table, Consistency of data, independence, and association of attributes. Measures of association - Yule's, Pearson's and Goodman-Kruskal's coefficients,Idea of Odds Ratio, Binary response and logistic regression.	CO1, CO4
III	Generating Functions	Generating function, probability generating function, moment generating function, cumulant generating function and characteristic function. Conditional mean and variance.	CO2, CO3, CO4
IV	Discrete and Continuous Probability Distributions	Discrete Probability Distributions: Uniform, Bernoulli, Binomial, Poisson, Geometric, Negative Binomial, Hypergeometric. Continuous Probability Distributions: Uniform, Exponential, Cauchy, Beta, Gamma, Normal, Lognormal.	CO2, CO3, CO4, CO5

Reference Books:

1. Goon, A.M., Gupta, M.K. and Dasgupta, B. (2002): Fundamentals of Statistics, Vol. I, 8th Edn.The World Press, Kolkata
2. Goon, A.M., Gupta, M.K. & Dasgupta, B. (1994): An Outline of Statistical Theory (Vol-1), World Press
3. Rohatgi, V. K. and Saleh, A.K. Md. E. (2009): An Introduction to Probability and Statistics. 2nd Edn. (Reprint) John Wiley and Sons.

Suggested Readings:

1. Hogg, R.V. & Craig, A.T. (2002):- Introduction to Mathematical Statistics. Pearson Education India
2. Rohatgi, V.K. (1975):- An Introduction to the Theory of Probability and Mathematical Statistics
3. W. Feller: Introduction to Probability: Theory and Applications - Vol. I and II.
4. J. Pitman: Probability.
5. Sheldon Ross: Probability Models.
6. P. G. Hoel, S. C. Port and C. J. Stones: Introduction to Probability Theory.
7. K. L. Chung: Elementary Probability Theory with Stochastic Processes.
8. R. Meester: A Natural Introduction to Probability Theory.
9. Miller, Irwin and Miller, Marylees (2006): John E. Freunds Mathematical Statistics withApplications, (7th Edn.), Pearson Education, Asia.
10. Mood, A.M., Graybill, F.A. and Boes, D.C. (2007): Introduction to the Theory of Statistics, 3rd Edn.(Reprint), Tata McGraw-Hill Pub. Co. Ltd.
11. Tukey, J.W. (1977): Exploratory Data Analysis, Addison-Wesley Publishing Co.
12. Santosh S. Venkatesh: Theory of Probability - Explorations and Applications.
13. Parzen, E. (1972): Modern Probability Theory and its Applications, John Wiley.
14. Uspensky, J.V. (1937): Introduction to Mathematical Probability, McGraw Hill.
15. Cacoullos, T. (1973): Exercises in Probability, Narosa.
16. Rahman, N.A. (1983): Practical Exercises in Probability and Statistics, Griffin.
17. Ross, S. (2002): A First Course in Probability, Prentice Hall.
18. Hogg, R.V., Tanis, E.A. and Rao J.M. (2009): Probability and Statistical Inference, Seventh Ed,Pearson Education, New Delhi.
19. Myer, P.L. (1970): Introductory Probability and Statistical Applications, Oxford & IBH Publishing,New Delhi.

List of Suggested Practical:

1. Problems based on the analysis of bivariate data.
2. Rank correlation.
3. Partial and multiple correlations.
4. Problems based on analysis of categorical data.

5. Fitting of discrete and continuous distributions.
6. Problems based on area and the ordinate for a specified area for normal distribution with application

Teaching Pedagogy:

S. No.	Description	Used (Yes/No)
1	Lecture	Yes
2	Discussion/Demonstration	Yes
3	Case Study	Yes
4	Test/Assignment	Yes
5	Student Seminars/Presentation	Yes

CO-PO mapping:

CO/PO	PO1 (Critical Thinking)	PO2 (Effective Communication)	PO3 (Social Interaction)	PO4 (Effective Citizenship)	PO5 (Ethics)	PO6 (Environment and Sustainability)	PO7 (Self-directed and Life-long Learning)
CO1	L	H	H	M			M
CO2	H	M	M				H
CO3	H	M	M				H
CO4	H	M	M				H
CO5	H						H
Avg.	2.6	1.8	1.8	0.4			2.8

*** **H** means High relevance, **M** means medium relevance, **L** means Low relevance

SEMESTER-II

Course Name: Data Structures and Algorithms using C/C++

Course Type: Minor.

Credit: 4 [Lecture: 2, Practical: 2].

Course Outcomes (CO):
CO1: Understanding the fundamental concepts of data, data types, and abstract data types.
CO2: Implementation of different abstract data types using various data structures.
CO3: Applying different types of data structures to implement various application problems.
CO4: Understanding and implementing different searching and sorting techniques.
CO5: Analyzing the suitability and compatibility of different data structures based on application types.

COURSE CONTENT

Module No.	ModuleName	ChapterTopic	CO
I	Introduction	Problem solving through computer, Design of algorithm to solve a problem, Concept of static and dynamic memory allocation, Algorithms and data structures, Concept of Abstract Data Type (ADT) with examples Efficiency of an algorithm, Asymptotic notations,Time and space complexities, Analysis of algorithms, Comparing asymptotic running times, Impact of data structure on the performance of an algorithm	CO1
II	Array, Stack,	Array,Single and multi-dimensional array,Memory representation(row major and column major) of array, Insertion,and deletions in array,Advantages and disadvantages of array Stack as an ADT, Main operations (push and pop), auxiliary operations and axioms, Array implementation of stack, Limitation of array implementation, Linked list implementation of stack, Applications of stack: Recursion, Function call, Evaluation of postfix expression using stack, Conversion of infix to postfix using stack.	CO2
III	Queue, Tree	Queue as an ADT, Main operations (enqueue and dequeue), Auxiliary operations andaxioms, Array implementation of queue, Limitation of array implementation and Circular queue, Linked list implementation of queue, Double ended queue (dequeue) Priority queue and its applications Binary Tree, Definition and properties, Representation of binary tree in memory: linked representation, array representation, Binary tree traversal, Preorder, Inorder and Postorder, Expression tree, Heap and its applications, Binary search tree, Balanced binary search tree, AVL tree, RedBlack tree, M-way tree, M-way search tree, B tree, B+ Tree	CO3
IV	Searching and Sorting	Linear search and binary search. Bubble, selection, insertion, Quick sort, Merge sort, Heap	CO4

		sort, Radix sort	
V	Graphs and Hashing	Mathematical Properties, Degree, Connectedness, Representation using matrix, Adjacency list, Directed Graphs, Directed Acyclic Graph Hash functions. Collision, Collision resolution techniques: linear probing, quadratic probing, double hashing, chaining, Rehashing	CO5

Suggested Readings:

Text Books:

1. R. F. Gilberg and B. A. Forouzan, "Data Structures: A pseudocode approach with C", 2nd Edition, CENGAGE Learning.
2. A. V. Aho, J. D. Ullman and J. E. Hopcroft, “Data Structures and Algorithms”, Addition Wesley.
3. Lipschutz, “Data Structures (Schaum’s Outline Series)”, Tata Mcgraw Hill.
4. E. Horowitz, S. Sahni, S. Anderson-Freed, “Fundamentals of Data Structures in C”, Universities Press; Second edition (2008).

Reference Books:

1. Y. Langsam, M. J. Augenstein and A. N. Tanenbaum, "Data Structures using C and C++", Pearson, 2006.
2. Knuth, Donald E. The Art of Computer Programming. 3rd ed. Vols 1&2. Reading, MA: Addison-Wesley, 1997. ISBN: 0201896834. ISBN: 0201896842. ISBN: 0201896850.
3. Kleinberg and Eva Tardos. Algorithm Design. Addison-Wesley 2005 ISBN-13: 978-0321295354.

Teaching Pedagogy:

S. No.	Description	Used (Yes/No)
1	Lecture	Yes
2	Discussion/Demonstration	Yes
3	Case Study	No
4	Test/Assignment	Yes
5	Student Seminars/Presentation	Yes

CO-PO mapping:

CO/PO	PO1 (Critical Thinking)	PO2 (Effective Communication)	PO3 (Social Interaction)	PO4 (Effective Citizenship)	PO5 (Ethics)	PO6 (Environment and Sustainability)	PO7 (Self-directed and Life-long Learning)
CO1	L	H	H	M			M
CO2	H	M	M				H
CO3	H	M	M				H
CO4	H	M	M				H
CO5	H						H
Avg.	2.6	1.8	1.8	0.4			2.8

*** **H** means High relevance, **M** means medium relevance, **L** means Low relevance

SEMESTER-II

Course Name: Introduction to Development Studies

Course Type: Multi-Disciplinary Course.

Credit: 3 [Lecture: 3]

Course Outcomes (CO):

CO1: Students will be able to understand the notion of economic development and its difference with the concept of growth.
CO2: Students will be able to understand the issues of structural transformation in less developed economies.
CO3: Students will be able to understand the concept of human development, poverty, inequality and learn to develop commonly used human development, inequality and poverty indices.
CO4: Students will be able to analyze the problems of development and ways to overcome underdevelopment.
CO5: Students will be able to critically assess the role of institutions, governance, and policies in promoting or hindering economic development in less developed economies.

COURSE CONTENT

Module No.	Module Name	Chapter Topic	CO
1.	Growth and Development	Growth vs development. Is per-capita income a good measure of development? Growth & Development in India. Commodities vs Capabilities. Low Level Equilibrium Trap and Big Push, Vicious Cycle of Poverty.	CO1, CO4
2.	Poverty and Inequality	Poverty: measures and indices. Absolute and Relative Poverty, Poverty Line. Inequality: Measurement and indices. Horizontal and Vertical Inequality, Axiomatic Approach to Measuring Poverty and Inequality: Multidimensional measures	CO3
3.	Human Development & Sustainable Development	From income to multi-dimensional measure of development--Human Development Index, Gender Development Index, Inequality Adjusted Human Development Index, The Planetary Pressures–Adjusted Human Development Index. Issues of Sustainability: Sustainable Development Goals.	CO3,CO4, CO5

Suggested Readings:

1. Dutt, A. K. (2014). *Pathways to economic development*. OUP Catalogue.

2. Ray, D. (1998). *Development economics*. Princeton University Press.

3. Sen, Amartya (2001). *Development as freedom (2nd ed.)*. Oxford New York: Oxford University Press.

4. Haq, M. U. (1991). Human development report 1991.
5. Klugman, J. (2011). Human Development Report 2011. Sustainability and Equity: A better future for all. *Sustainability and Equity: A Better Future for All (November 2, 2011). UNDP-HDRO Human Development Reports*.
6. Basu, K. (2000). On the goals of development. *Frontiers of development economics: The future in perspective*, 61-86.

Teaching Pedagogy:

S. No.	**Description**	**Used (Yes/No)**
1	Lecture	Yes
2	Discussion/Demonstration	Yes
3	Case Study	No
4	Test/Assignment	Yes
5	Student Seminars/Presentation	Yes

CO-PO mapping:

CO/PO	PO1 (Critical Thinking)	PO2 (Effective Communication)	PO3 (Social Interaction)	PO4 (Effective Citizenship)	PO5 (Ethics)	PO6 (Environment and Sustainability)	PO7 (Self-directed and Life-long Learning)
CO1	M	M	H	M			M
CO2	M	M		M			M
CO3	M	M		M			M
CO4	H	H	M	L			H
CO5	H			M			H
Avg.	2.4	1.8	1	1.8	0	0	2.4

*** **H** means High relevance, **M** means medium relevance, **L** means Low relevance

SEMESTER-II

Course Name: Principles of Management.

Course Type: Multi-Disciplinary Course.

Credit: 3 [Lecture: 3].

Course Objectives:

CO1: Students can enhance their decision-making and analytical skills, students will need to think critically and strategically about management theories and issues

CO2: Explore different organizational structures, leadership styles, and management approaches relevant to engineering firms.

CO3: Teach students how to develop strategic plans, set objectives, and apply decision-making techniques in engineering projects.

CO4: Students will be required to think critically and strategically about management theories and issues, which will enable them to develop their decision-making and analytical skills.

CO5: Explain the concept, principles, and significance of Total Quality Management in modern organizations.

COURSE CONTENT

Module No	Module Name	Topic(s)	Associated course outcome (CO)
Unit 1:	NATURE AND FUNCTIONS OF MANAGEMENT:	Definition, Nature- Features of Management, Evaluation of Management Theories, Management Functions, Management as a Process, Importance of Management, Management and Administration.	CO1

Unit 2:	Functions And Functional Areas of Management:	Functions of Management : Planning – Concept, Nature, Types, Analysis, Management by objectives; Organization Structure – Concept, Structure, Principles, Centralization, Decentralization, Span of Management; Organizational Effectiveness.	CO1, CO3
		Functional Areas of Management, Managerial Skills, Roles of a Manager, Levels of Management, Management as a Science, an Art and as a Profession.	
Unit 3:	Organization And Organization Structure:	Introduction, Organizational Design, Hierarchical Systems ,	CO2
		Organization Structure, Types of Organization Structure, Formal and Informal Organization, Factors Determining Span of Management, Centralization and Decentralization, Span of control, Understanding authority and responsibility, Principles of Delegation, Authority, Developing a culture of Innovation and performance.	CO2
Unit 4	Managerial Competencies:	Communication, Motivation, Team Effectiveness, Conflict Management, Creativity, Entrepreneurship	CO1, CO2, CO3
		Concept, Nature, Styles of Leadership	CO1, CO2,CO3
		Concept, Nature, Process of Decision making	CO1, CO2, CO3, CO4
Unit 5	Quality Management & Performance Improvement	Concept of TQM, Principles of TQM (Customer Focus, Continuous Improvement, Employee Involvement), TQM Tools & Techniques (Six Sigma, PDCA Cycle, Kaizen), Case Studies of TQM in Businesses.	CO4, CO5

Suggested Reading:

1. Principles of Management, Premvir Kapoor, Khanna Publishing House, New Delhi (2018)
2. A. Aswathapa, Organizational Behaviour, 2010
3. Principles And Practice Of Management, Prasad L M, Sultan Chand & Sons, 2019.

Teaching Pedagogy:

S. No.	**Description**	**Used (Yes/No)**
1	Lecture	Yes
2	Discussion/Demonstration	Yes
3	Case Study	No
4	Test/Assignment	Yes
5	Student Seminars/Presentation	Yes

CO-PO mapping:

CO/PO	PO1 (Critical Thinking)	PO2 (Effective Communication)	PO3 (Social Interaction)	PO4 (Effective Citizenship)	PO5 (Ethics)	PO6 (Environment and Sustainability)	PO7 (Self-directed and Life-long Learning)
CO1	H	M	M	L			
CO2	H	M	M				M
CO3	H	M	M	L			
CO4	H	M	M	L			
CO5	H	M	M	L			
Avg.	3	2	2	0.8	0	0	0.4

*** **H** means High relevance, **M** means medium relevance, **L** means Low relevance

SEMESTER-II

Course Name: Communicative English II.

Course Type: Ability Enhancement Course.
Credit: 2 [Lecture: 2].

Course Outcomes (CO):

CO1: To understand the basic methods of reading and comprehending a passage to enable students to identify main ideas and draw relevant inferences.
CO2: To analyze the role of communication in a professional and personal space and develop an interactive ability.
CO3: To examine the need to write formal business letters and emails using appropriate vocabulary and develop advanced communication skills
CO4: To evaluate methods of group discussion and mock interviews to prepare the students for real life situations.
CO5: To create effective communicators with the ability to express themselves in the workplace and elsewhere.

COURSE CONTENT

Module No.	Module Name	Chapter Topic	CO
I	Reading Comprehension	A. Skimming and scanning, identifying main ideas, drawing inferences (Related texts should be selected by the concerned faculty member of the department for practicing comprehension skills)	CO1, CO2
II	Business English	A. Role of Communication in the business world - introduction B. Business letters C. Meetings - Writing Notice, Agenda, Minutes D. CV & Cover Letter E. E-mail F. Writing Reports - types (commercial) G. Writing Business Proposal	CO2, CO3 & CO4
III	Soft Skills	A. Skills of listening, speaking, reading & writing in theory. B. Group Discussion: Concept of a Group Discussion/Interview, Types of Group Interviews, Skills Evaluated in a GD, Methods to Adopt in a Group Discussion, Mock Group Discussions	CO3 & CO4

Suggested Reading:

1. Raymond Murphy, Intermediate English Grammar, Cambridge University Press
2. Martin Hewings, Advanced Grammar in Use, Cambridge University Press
3. W. Stannard Allen, Living English Structure (5th Edition), Pearson Publications
4. Sureshkumar and P. Sreehari, Communicative English, E. Orient Blackswan
5. Tony Lynch, Study Listening, Cambridge University Press
6. Jeremy Comfort, Speaking Effectively, Cambridge University Press

Teaching Pedagogy:

S. No.	**Description**	**Used (Yes/No)**
1	Lecture	Yes
2	Discussion/Demonstration	Yes
3	Case Study	No
4	Test/Assignment	Yes
5	Student Seminars/Presentation	Yes

CO-PO mapping:

CO/PO	PO1 (Critical Thinking)	PO2 (Effective Communication)	PO3 (Social Interaction)	PO4 (Effective Citizenship)	PO5 (Ethics)	PO6 (Environment and Sustainability)	PO7 (Self-directed and Life-long Learning)
CO1	H	H					
CO2	M	H					H
CO3		H	M				H
CO4			M				H
CO5		M	M				M
Avg.	1	2.2	1.2	0	0	0	2.2

*** **H** means High relevance, **M** means medium relevance, **L** means Low relevance

SEMESTER-II

Course Name: Spreadsheet and SPSS

Credit: 3, [Lecture: 0, Practical: 3]

Course Outcomes (CO):

CO1: Understanding different data types and structures
CO2: Learning cell and worksheet operations in spreadsheet
CO3: Making the students acquainted with advanced Spreadsheet functions and tools
CO4: Applying Spreadsheet and SPSS for data visualization,
CO5: Learning evaluation of descriptive statistics using Spreadsheet and SPSS.

COURSE CONTENT

Module No.	Module Name	Chapter Topic	CO
I	Introduction to Spreadsheet	Introduction to Spreadsheet: Entering raw data, types of data, cell position and reference (absolute and relative), Transforming Raw Data to Frequency Table (Discrete, Continuous). Cumulative Frequency Table. Cell Operations: Conditional Formatting; Sorting; Filtering, Custom Filtering; Insert, Delete, Format Cells. Data Tools: Remove Duplicates, Wrapping, Merging, Alignments Splitting Data sheets, Hiding operations.	CO1, CO2
II	Introduction to SPSS	The Data Editor, creating variables and Entering data, Types of variables, assigning values to the variables, Selecting and Sorting Cases, Splitting and Merging Files, Computing and Recoding variable. Transpose of data – insert variables and cases – merge variables and cases.	CO4, CO5
III	Summarisation of data	Measures of central tendency: Arithmetic mean, Geometric mean, Harmonic Mean, Median and Mode Measures of Dispersion: Range, Mean Deviation, Quartile Deviation, Standard Deviation; Skewness and Kurtosis. Bivariate Data: Scatter plots, Karl Pearson's Coefficient of Correlation, Spearman's Rank Correlation, Regression analysis: Simple Linear Regression	CO5
IV	Diagrammatic and graphical representation of data	Pie Diagram, Bar Diagram, Line Diagram, Histogram, Boxplot, Ogive.	CO2, CO3, CO4

Textbooks:

1. Field, A. (2005): Discovering Statistics Using SPSS (Fourth Edition). SAGE Publication.
2. Levine D M, Berenson M L, and Krehbiel T C (2008) Statistics for Managers Using Microsoft Excel, Fifth Edition, Published by Prentice Hal

Suggested Readings:

1. Jeremy J. Foster (2001). Data analysis using SPSS for windows. New edition. Versions 8-10. Sage publications. London.
2. Quirk, T. J., Saccuzzo, D. P., & Wilson, L. R. (2015). Statistics for business and economics: Microsoft Excel manual (13th ed.). Pearson.
3. Albright, S. C., Winston, W. L., & Zappe, C. J. (2016). Data analysis and decision making with Microsoft Excel (5th ed.). Cengage Learning.
4. Triola, M. F. (2017). Elementary statistics using Excel (6th ed.). Pearson.
5. Siegel, A. F., & Shim, J. K. (2017). Schaum's outline of statistics for business and economics: Including Microsoft Excel. McGraw-Hill Education.
6. Cunningham, B.J (2012): Using SPSS: An Interactive Hands-on approach
7. Landau, S. and Everitt, S.L. (2004): A Handbook of Statistical Analyses using SPSS. Chaspman& Hall/CRC
8. Moore, D.S. and McCabe, G.P. and Craig, B.A. (2014): Introduction to the Practice of Statistics, W.H. Freeman 2. Cunningham, B.J (2012): Using SPSS: An Interactive Hands-on approach

List of Suggested Practical:

1. Creating a frequency distribution table
2. Measures of central tendency
3. Measures of Dispersion.
4. Measures of Skewness and Kurtosis.
5. To draw scatter plots for a given bivariate dataset and its interpretation
6. To compute the Karl Pearson’s correlation coefficient and its interpretation
7. Fit a simple linear regression model.
8. Determination of the slope and intercept in the context of the data, to predict values based on the regression equation
9. Comparing means- One and two sample t- tests
10. Comparing several means using one way and two- way ANOVA.

Teaching Pedagogy:

S. No.	Description	Used (Yes/No)
1	Lecture	Yes
2	Discussion/Demonstration	Yes
3	Case Study	No
4	Test/Assignment	Yes
5	Student Seminars/Presentation	Yes

CO-PO mapping:

CO/PO	PO1 (Critical Thinking)	PO2 (Effective Communication)	PO3 (Social Interaction)	PO4 (Effective Citizenship)	PO5 (Ethics)	PO6 (Environment and Sustainability)	PO7 (Self-directed and Life-long Learning)
CO1	H	H					
CO2	M	H					H
CO3		H	M				H
CO4			M				H
CO5		M	M				M
Avg.	1	2.2	1.2				2.2

*** **H** means High relevance, **M** means medium relevance, **L** means Low relevance

SEMESTER-II

Course Name: Service Learning.

Course Type: Common Value-Added Course.

Credit: 2 [Lecture: 2].

Course Outcomes (CO):

At the end of this course, students will be able to

CO1: Understand the concept of service learning and University-Community Engagement

CO2: Critically think and identify community problems

CO3: Work more collaboratively with others on various social issues

CO4: Organize, initiate, participate or contribute to community based programmatic interventions

O5: Demonstrate the ability to reflect on personal experiences and learning outcomes from community engagement and apply these insights to future social responsibility initiatives.

COURSE CONTENT

[See the Following 3 Pages]

Sl. No	Topic	Sub-topic	Description	CO
1.	Meaning and Scope of Service Learning and Community Engagement	Concept of Service Learning and Community Engagement	Understanding Service Learning and Community Engagement: Its Philosophy and Purpose, Models of Service Learning: Project Model, Charity Model, Social Justice Model	CO1
2.	Understanding Social Issues and Development	Understanding Social Issues and Development	Understanding Social Issues relating to Poverty and Unemployment, Gender Discrimination, , Health and Nutrition, Climatic Change and Community Resilience, Water and Sanitation, Environmental Concerns, Ageing and elderly Care, Issues of Marginalized sections	CO1, CO2
3	Communication for Development (C4D)	Concept of C4D and its significance in Human Development, Social and Behavioural Chance	Theories of Communication, C4D and Human Development, Communication for Social and Behavioural Change, Socio-Ecological Model and Situational Analysis, Design and Implementation of C4D Plan	CO1, CO2
3.	Understanding University-Community Engagement	University-Community Engagement	History of Service Learning in the context of Indian universities Best Practices of University-Community Engagement Jesuit Service Learning in India Initiatives taken by St. Xavier's University, Kolkata for Community Development: A Case Study	CO1, CO2
4.	Field Visits and Institution Visits	Sites for Field Visits	Anganwadi Centres School: Primary and High Schools Health Centres Panchayat Library Youth Club Self-Help Groups Block Development Office Post Office Places of Historical Importance Old Age Home and Child Care Institutions	CO2, CO5

			Institutions for Differently Abled Persons (Divyang) NGO visit Agencies working with concepts relating to SBCC **(*Visits should be followed by report writing, presentation and discussion)**	
5.	Practices for Service Learning and University-Community Engagement	Practicing Service Learning	In collaboration with community members like Village Panchayats, Parents, Educational Institutions (Heads, Teachers and Students), Anganwadis and Health Centres students will be engaged with any the following types of field based programmatic interventions. • Organizing or participating in awareness generation programme relating to various social issues like early childhood care and nutrition among parents, importance of education and digital literacy among community members, good habits among primary school children, life skills and menstrual hygiene among secondary school students, environmental issues among community members, gender based violence • Supplementary educational support for children in elementary education that includes conducting remedial classes, and providing tutorial support to low performing students, promote joyful teaching and learning methods • Engaging with initiatives/activities relating to skill development and livelihood generation for rural youth	CO3, CO4

			and women through vocational training courses, career counseling, conducting training programmeson soft skills and digital literacy, personality development • Engaging children and adolescent with initiatives relating to Life Skill Education, extracurricular activities like art, dance, singing, initiating plantation drives • Providing services to children, person with special need, elderly persons in institutions and difficult circumstances • Organizing and participating in Health and Blood donation camps, at the community level • Initiating or participating in activities relating to neighborhood learning • Engaging with initiatives relating to Social and Behavioral Change Communication (SBCC)	

Suggested Readings:

1. Cress, Christine M., Collier, Peter J., Reitenauer, Viki L. (2005). Learning Through Serving: A Student Guidebook for Service Across Disciplines. Sterling Virginia.
2. Jacoby, B. (2010). Service learning in higher education: concepts and practices. Michigan: Jossey-Bass Publishers.
3. Lavery, S., Chambers, D. and Cain, G. (2018). Service Learning: Enhancing Inclusive Education.
4. Speck, B.W., & Hoppe, S.L. (2004). Service-learning: History, Theory and Issues. Connecticut: Greenwood Publishing Group.
5. Communication for Social and Behavioural Change (CSBC) Learning Module Series by unicef .

Teaching Pedagogy:

S. No.	Description	Used (Yes/No)
1	Lecture	Yes
2	Discussion/Demonstration	Yes
3	Case Study	No
4	Test/Assignment	Yes
5	Student Seminars/Presentation	Yes

CO-PO mapping:

CO/PO	PO1 (Critical Thinking)	PO2 (Effective Communication)	PO3 (Social Interaction)	PO4 (Effective Citizenship)	PO5 (Ethics)	PO6 (Environment and Sustainability)	PO7 (Self-directed and Life-long Learning)
CO1	M						
CO2	M	M	M	H	H		
CO3		M	M		H		
CO4		M	M				M
CO5	H						H
Avg.	1.4	1.2	1.2	0.6	1.2		1

*** **H** means High relevance, **M** means medium relevance, **L** means Low relevance

SEMESTER-II

Course Name: Understanding Indian Constitution.

Course Type: Common Value-Added Course.

Credit: 2 [Lecture: 2].

Course Outcomes (CO):

CO1: Understand the concept, necessity and value of the Constitution as a Bill of Rights, and as a federal compact.
CO2: Appreciate the constitutional character of India as a welfare state.
CO3: Understand and analyze the relationship between the state and the people, especially in terms of the limits on the former in relation to the latter, and the obligations of the former towards the latter.
CO4: Appreciate the fundamental duties of citizens as participant actors of the welfare state.
CO5: Understand and analyze the federal structure of the constitutional polity and the scheme of distribution of powers between the Union and the States.

COURSE CONTENT

Module No.	Module Name	Chapter Topic	Description	CO
I	Introduction to Indian Constitution	- The idea of a constitution - The Preamble and key objectives of the Constitution of India - Salient features of the Constitution of India	Background and salient features	CO1
II	Republic of India as a welfare state	- Social justice principles - Gandhian principles - Separation of powers and independence of the judiciary - Promotion of international peace and security - Fundamental Duties	Directive Principles of State Policy and Fundamental Duties	CO1, CO2, CO3, CO4

III	The Constitution as a Bill of Rights	- Right to equality - Right to freedom - Right to freedom of religion and conscience - Cultural and educational rights - Economic rights in incorporation of directive principles	Fundamental Rights	CO1, CO2, CO3
IV	Republic of India as a Union of States	- India as a Union of States under Article 1 - Legislative relations: Seventh Schedule and the principle of repugnancy - President and Council of Ministers; Governor and Council of Ministers; - Extent of executive powers of the Union and the States	The Federal System	CO1, CO5

Suggested Readings:

1. Indian Constitutional Law (M.P. Jain, Ruma Pal)
2. Constitution of India (V.N. Shukla, M.P. Singh)
3. Constitutional Law of India (J.N. Pandey)
4. The Constitution of India (P.M. Bakshi)
5. The Oxford Handbook of the Indian Constitution (Madhav Khosla, Pratap Bhanu Mehta, Sujit Choudhry)

Teaching Pedagogy:

S. No.	Description	Used (Yes/No)
1	Lecture	Yes
2	Discussion/Demonstration	Yes
3	Case Study	No
4	Test/Assignment	Yes
5	Student Seminars/Presentation	Yes

CO-PO mapping:

CO/PO	PO1 (Critical Thinking)	PO2 (Effective Communication)	PO3 (Social Interaction)	PO4 (Effective Citizenship)	PO5 (Ethics)	PO6 (Environment and Sustainability)	PO7 (Self-directed and Life-long Learning)
CO1	L			H	M	M	
CO2	L			H	M	M	
CO3	L			H	M	M	
CO4				H	M	M	
CO5	L			M			
Avg	0.8	0	0	2.8	1.6	1.6	0

*** **H** means High relevance, **M** means medium relevance, **L** means Low relevance