ST ALBERT'S COLLEGE (AUTONOMOUS) ERNAKULAM

Affiliated to Mahatma Gandhi University, Kottayam, Kerala

SYLLABUS FOR UNDERGRADUATE PROGRAMMES

BACHELOR OF SCIENCE (HONOURS) IN MATHEMATICS

STATISTICS (Minor)

SACA – UGP

(WITH EFFECT FROM 2024 ADMISSION)

FOR TRUTH AND SERVICE

Syllabus of BSc Statistics

Prepared by the Board of Studies on 21st August 2023

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Chairman, Board of Studies

Approved by the Academic Council on 14th March 2024

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Approved by the Governing Council on 27th March 2024

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FOR TRUTH AND SERVICE

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g. Co-opted members as special invitees:			
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3/20	Dr. Veena V S	Assistant Professor in Mathematics, Department of Data Analytics and Mathematical Science, JAIN (deemed-to-be university), Kochi	M Sc, NET, Ph D
4/21	Dr. Soubhagya S Prabhu	Assistant Professor in Statistics, Rajagiri School of Social Sciences (Autonomous), Kalamassery	M Sc, Ph D

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PREFACE

In alignment with the National Educational Policy, the Higher Education Council has launched a new curriculum that promotes multidisciplinary learning. This curriculum empowers students to choose their undergraduate subjects freely, offering a wider range of educational options.

This curriculum offers a comprehensive syllabus that integrates a vast array of knowledge and technological advancements. It prioritizes skill development, research, innovation, and value-added components to equip students with the professional and contemporary skills required for modern education.

The revised syllabus is the result of a collaborative effort by a dedicated team of subject experts in Statistics assembled by the M G University. We extend our sincere gratitude to the Board of Studies in Statistics at M G University for their invaluable contributions in developing a new Four-Year Degree Honors Programme curriculum.

In the curriculum of SACA-UGP (Honours) in Statistics, we are currently incorporating key elements of the MG University Syllabus, along with signature courses developed by the Board of Studies in Mathematics & Statistics at St. Albert's College (Autonomous), Ernakulam. We would like to express our gratitude to the University Nominee, Subject Experts, Industrial Experts, Alumni, and other stakeholders for their valuable contributions.

Dr. Sabu M.C.

Chairman, BoS Mathematics & Statistics

THE ST. ALBERTS COLLEGE (AUTONOMOUS) UNDERGRADUATE PROGRAMMES (HONOURS) REGULATIONS, 2024

SACA-UGP (Honours)

PREAMBLE

The University Grants Commission (UGC) has issued the Curriculum and Credit Framework for Undergraduate Programmes 2023 (CCFUP) which would provide a flexible choice-based credit system, multidisciplinary approach, multiple entry and exit options, and establish three Broad Pathways, (a) 3-year UG Degree, (b) 4-year UG Degree (Honours), and 4-year UG Degree (Honours with Research).

The Kerala Higher Education Reforms Commission has recommended a comprehensive reform in the undergraduate curriculum for the 2023-24 academic year, adopting 4-year undergraduate programmes to bring Kerala's undergraduate education at par with well acclaimed universities across the globe.

The Kerala State Curriculum Committee for Higher Education has been constituted and have proposed a model Kerala State Higher Education Curriculum Framework (KSHECF) for Undergraduate Education. Further, an Executive Committee and various sub committees were constituted for the implementation of the Regulations. Further, MGU has framed the Rules and Regulations based on this namely: THE MAHATMA GANDHI UNIVERSITY UNDERGRADUATE PROGRAMMES (HONOURS) REGULATIONS, 2024 {MGU-UGP (Honours)} under the New Curriculum and Credit Framework, 2024. Being an Autonomous college affiliated to MG University, St. Albert's College is adopting all the major components of MGU UGP (Honours) 2024 in the title SACA-UGP (Honours) to our UG curriculum from the academic year (2024-25) onwards.

1. **Short Title and Commencement**

   a) The Regulations will be called as "**THE ST. ALBERT'S COLLEGE (AUTONOMOUS) UNDERGRADUATE PROGRAMMES (HONOURS) REGULATIONS, 2024 {SACA-UGP (Honours)}"** under the New Curriculum and Credit Framework 2024.

   b) These Regulations will come into effect from the academic year 2024-2025 and will have prospective effect.

2. Scope, Application

a) These Regulations shall apply to all undergraduate programmes (except B. Voc.) of ST. ALBERT'S COLLEGE (AUTONOMOUS) for the Admissions commencing in the academic year 2024-2025.

b) Every programme conducted under the SACA-UGP shall be monitored by the SACA-UGP Academic Committee (Academic Council).

3. Definitions

Unless context otherwise required,

i. FYUGP means Four Year Undergraduate Programme.

ii. Academic Year: Two consecutive (one odd and one even) semester followed by a vacation in one academic year.

iii. Academic Coordinator/Nodal Officer: Academic Coordinator/Nodal Officer is a faculty nominated by the College Council to co-ordinate the effective conduct of the FYUGP including Continuous Comprehensive Assessment (CCA) undertaken by various departments within the College. She/ he/ they shall be the convenor for the College level Academic Committee.

iv. Academic Week: A unit of five working days in which the distribution of work is organized, with five contact hours of one-hour duration on each day.

v. Academic Credit: A unit by which the course work is measured. It determines the number of hours of instructions required per week in a semester. It is defined both in terms of student efforts and teacher's efforts. A course which includes one hour of lecture or tutorial or minimum 2 hours of lab work/ practical work/ field work per week is given one credit hour. Accordingly, one credit is equivalent to one hour of lecture or tutorial or two hours of lab work/ practical work/ field work/ practicum and learner engagement in terms of course related activities (such as seminar preparation, submitting assignments, group discussion, recognized club-related activities etc.) per week. Generally, a one credit course in a semester should be designed for 15 hours lecture/ tutorials or 30 hours of practical/ fieldwork/ practicum and 30 hours learner engagement.

vi. Academic Bank of Credits (ABC): An academic service mechanism as a digital/ virtual entity established and managed by Government of India to facilitate the learner to become its academic account holders and facilitating seamless learner mobility, between or within degree-granting Higher Education Institutions (HEIs) through a formal system of credit recognition, credit accumulation, credit transfers

and credit redemption to promote distributed and flexible process of teaching and learning. This will facilitate the learner to choose their own learning path to attain a Degree/ Diploma/ Certificate, working on the principle of multiple entry and exit, keeping to the doctrine of anytime, anywhere, and any level of learning.

vii. Credit Accumulation: The facility created by ABC in the Academic Credit Bank Account (ABA) opened by the learner across the country in order to transfer and consolidate the credits earned by them by undergoing courses in any of the eligible HEIs.

viii. Credit Recognition: The credits earned through eligible/ partnering HEIs and transferred directly to the ABC by the HEIs concerned.

ix. Credit Redemption: The process of commuting the accrued credits in the ABC of the learner for the purpose of fulfilling the credits requirements for the award of various degrees. Total credits necessary to fulfil the criteria to get a degree shall be debited and deleted from the account concerned upon collecting a degree by the learner.

x. Credit Transfer: The mechanism by which the eligible HEIs registered with ABC are able to receive or provide prescribed credits to individuals registered with ABA in adherence to the UGC credit norms for the course(s) registered by the learner in any HEIs within India.

xi. Credit Cap: Maximum number of credits that a student can take per semester, which is restricted to 30.

xii. Continuous Comprehensive Assessment (CCA): The mechanism of evaluating the learner by the course faculty at the institutional level.

xiii. End Semester Evaluation (ESE): The mechanism of evaluating the learner at the end of each semester.

xiv. Audit Course: A course that the learner can register without earning credits and is not mandatory for completing the SACA-UGP. The student has the option not to take part in the CCA and ESE of the Audit Course. If the student has 75% attendance in an Audit Course, he/ she/ they are eligible for a pass in that course, without any credit (zero-credit).

xv. Courses: Refer to the papers which are taught and evaluated within a programme, which include lectures, tutorials, laboratory work, studio activity, fieldwork, project work, vocational training, viva, seminars, term papers, presentations, assignments, self-study, group discussion, internship, etc., or a combination of some of these elements.

xvi. Choice Based Credit System (CBCS) means the system wherein students have the option to select courses from the prescribed list of courses.

xvii. College-level Academic Committee: Is a committee constituted for the FYUGP at the College level comprising the Principal as the Chairperson, the Academic Co-ordinator/ Nodal Officer as its convenor.

xviii. Academic Co-ordinator/ Nodal Officer: A senior faculty member nominated by the College Council.

xix. Course Faculty: A faculty member nominated by the Head of the Department shall be in charge of offering a particular course in a particular semester of FYUGP.

xx. Department means any teaching department in a college offering a course of study approved by the Governing body and statutory bodies of the College.

xxi. Senior Faculty Advisor (SFA) is a faculty nominated by a Department Council to coordinate all the necessary work related to FYUGP undertaken in that department, including the Continuous Comprehensive Assessment.

xxii. Department Council means the body of all teachers of a department in a college.

xxiii. Faculty Advisor (FA) means a teacher from the parent department nominated by the Department Council to advise students in academic matters.

xxiv. Graduate Attributes means the qualities and characteristics to be obtained by the graduates of a programme of study at the College, which include the learning outcomes related to the disciplinary areas in the chosen field of learning and generic learning outcomes. The graduate attributes for its programmes will be specified.

xxv. Programme means the entire duration of the educational process including the evaluation leading to the award of a degree.

xxvi. Programme Pathway: Combination of courses that can be chosen by a student that give options to pursue interesting and unconventional combinations of courses drawn from different disciplinary areas, like the sciences and the social sciences/ humanities. The pathways could be in terms of major- minor options with different complementary/allied disciplines.

xxvii. Regulatory Body means University Grants Commission (UGC), All India Council for Technical Education (AICTE), National Council for Teacher Education (NCTE), Medical Council of India (MCI), Pharmacy Council of India (PCI), Indian Council for Agricultural Research (ICAR), Bar Council of India, Council of Architecture, National Assessment and Accreditation Council (NAAC) and

National Board of Accreditation (NBA) etc.

xxviii. Signature Courses: Signature courses are the specialized Discipline Specific Elective courses or skill enhancement/value addition courses offered by the regular/ ad hoc/visiting/ emeritus/ adjunct faculty member of a particular Department with the prior recommendation of the BoS and the approval of Academic Council of the College.

xxix. Letter Grade or simply 'Grade' in a course is a letter symbol (O, A+, A, B+, B, C, P, F, and Ab). Grade shall mean the prescribed alphabetical grade awarded to a student based on their performance in various examinations. The Letter grade that corresponds to a range of CGPA.

xxx. Grade Point: Each letter grade is assigned a 'Grade point' (G) which is an integer indicating the numerical equivalent of the broad level of performance of a student in each course. Grade Point means point given to a letter grade on 10-pointscale.

xxxi. Semester Grade Point Average (SGPA) is the value obtained by dividing the sum of credit points obtained by a student in the various courses taken in a semester by the total number of credits in that semester. SGPA shall be rounded off to two decimal places. SGPA determines the overall performance of a student at the end of a semester.

xxxii. Credit Point (P) of a course is the value obtained by multiplying the grade point (G) by the credit (C) of the course: $P = G \times C$

xxxiii. Cumulative Grade Point Average (CGPA) is the value obtained by dividing the sum of credit points in all the semesters earned by the student for the entire programme by the total number of credits in the entire programme and shall be rounded off to two decimal places

xxxiv. Grade Card means the printed record of students' performance, awarded to them.

xxxv. Words and expressions used and not defined in this regulation but defined in the M. G. University Act and Statutes, and College handbook shall have the meaning assigned to them in the Act and Statutes and handbook

4. Features and Objectives of SACA-UGP 2024

The features and objectives of the SACA-UGP 2024 shall be:

a) The features, meaning, and purpose of FYUGP shall be as stipulated by the UGC and as adapted by the Kerala State Higher Education Curriculum Framework (KSHECF) and MGU-UGP (Honours) for undergraduate education.

b) The practice of lateral entry of students to various semesters exists, but an

exit with a Degree shall be awarded only upon successful completion of 133 credits as per the conditions stipulated in this regulation.

c) FYUGP shall have three Broad Pathways, (a) 3-year UG Degree, (b) 4-year UG Degree (Honours), and (c) 4-year UG Degree (Honours with Research).

d) Students who choose to exit after 3 years shall be awarded UG Degree in their respective Discipline/ Disciplines after the successful completion of the required minimum Courses with 133 credits.

e) A 4-year UG Degree (Honours) in the Discipline/ Disciplines shall be awarded to those who complete the SACA-UGP with a specific number of Courses with 177 credits including 12 credits from a capstone level graduate project/dissertation. Those students who are not doing capstone project shall do three courses at the level 400 or above or three vocational training courses or internships for 12 credits.

f) Students who acquire minimum 75% in their graduation (upto 6th semester) are eligible for Honours with Research Programme. However, if necessary, College may conduct screening test for the honours with research programme in accordance with University and College Regulations time to time.

g) 4-year UG Degree (Honours with Research): Students who aspire to pursue research as a career may opt for 4-year UG Degree Honours with Research stream under FYUGP with a specific number of Courses with 177 credits including 12 credits from a research project in their major discipline.

h) The recognized research departments or departments with at least two faculty members having PhD shall offer the Honours with Research programme. Minimum 2 students (mentees) should be allotted to a faculty member (Mentor).

i)Students who have chosen the honours with research stream shall do their entire fourth year under the mentorship of a mentor.

j)The mentor shall prescribe suitable advanced level/capstone level courses for a minimum of 20 credits to be taken within the institutions along with the courses on research methodology, research ethics, and research topic-specific courses for a minimum of 12 credits which may be obtained either within the institution or from other recognized institutions, including online and blended modes. Students shall also be allowed to pursue these three courses of 12 credits from suitable interdisciplinary/ transdisciplinary/ multidisciplinary/ vocational areas of their choice.

k) Students who have opted for the honours with research should successfully complete a research project under the guidance of the mentor and

should submit a research report for evaluation. They need to successfully defend the research project to obtain 12 credits under a faculty member of the University/ College/Recognized Research Institute. The research shall be in the Major/ allied discipline.

l)The research outcomes of their project work may be published in peer-reviewed journals or presented at conferences or seminars or patented.

m) The proposed FYUGP curriculum comprises three broad parts: a) Foundation Components, b) Discipline Specific Pathway components (Major/ Minor), and c) Discipline Specific Capstone Components.

n) The Foundation component of the FYUGP shall consist of a Set of General Foundation Courses and a Set of Discipline Specific Foundation Courses.

o) General Foundation Courses shall be grouped into 4 major baskets as Ability Enhancement Courses (AEC), Skill Enhancement Courses (SEC), Value Addition Courses (VAC), and Multi-Disciplinary Courses (MDC).

p) Ability Enhancement Courses shall be designed specifically to achieve competency in English, other languages as per the student's choice with special emphasis on language and communication skills.

q) English or other language courses shall be designed to enable the students to acquire and demonstrate the core linguistic skills, including critical reading, academic and expository writing skills as well as the cultural and intellectual heritage of the language chosen. Separate courses will be designed for Science, Humanities and Commerce streams.

r) Multi-Disciplinary Courses (MDC) shall be so designed as to enable the students to broaden their intellectual experience by understanding the conceptual foundations of Science, Social Sciences, Humanities, and Liberal Arts. Students shall not be eligible to take the MDC in the same discipline that they have studied during their Plus Two. Third semester MDC can be Kerala specific content. Each BoS can prepare basket of courses under MDC.

s) Skill Enhancement Courses (SEC) shall be designed to enhance 21st century workplace skills such as creativity, critical thinking, communication, and collaboration.

t)Discipline Specific Courses shall include Discipline Specific Pathway Courses, both Major and Minor streams, enabling students to gain basic knowledge in the chosen discipline.

u) Discipline Specific Foundation Courses shall focus on foundational

theories, concepts, perspectives, principles, methods, and critical thinking essential for taking up advanced/ Capstone Courses. Practical courses shall be included in discipline specific foundation courses.

v) The curriculum of the SEC should be designed in a manner that at the end of year-1, year-2, year-3, and year-4 students are able to meet the level descriptors for levels 5, 6, 7, and 8 of the UGC Guidelines on National Skills Qualifications Framework (NSQF).

w) Value Addition Courses (VAC) shall be so designed as to empower the students with personality development, perspective building, and self-awareness.

x) Discipline Specific Pathway Components (Major/Minor) shall provide the students with an opportunity to pursue in-depth study of a particular subject or discipline and develop competency in that chosen area, which includes Discipline Specific Core (DSC) courses and Discipline Specific Elective (DSE) courses as Major and Minor courses.

y) Major components consist of three types: Discipline Specific Core or the Discipline Specific Elective Courses, and the research/laboratory/fieldwork.

z) Minor Courses can be selected from any discipline. A student who completes 12 credits in a particular stream will be eligible for a minor.

aa) Students who complete a sufficient number of Courses in a discipline or an interdisciplinary area of study other than their chosen Major shall qualify for a Minor in that discipline or in a chosen interdisciplinary area of study.

bb) Major Components shall be the main focus of study. By selecting a Major, the student shall be provided with an opportunity to pursue an in-depth study of a particular discipline.

cc) Each Board of Studies (BoS) shall identify specific Courses or baskets of Courses towards Minor Course credits. Students shall have the option to choose Courses from disciplinary/ interdisciplinary minors and skill-based courses related to a chosen programme.

dd) Students can opt for a change of Major at the end of the second semester to any Minor discipline studied among the foundation level courses. Students can also opt for a change of Major at the end of the second semester to any MDC.

ee) Students should opt their 5^{th} and 6^{th} semester VAC and SEC from their Major disciplines only.

ff) Course cum Credits Certificate: After the successful completion of a

semester, this certificate is essential as proof for re-entry to another institution. This will help the learner for preserving the credits in the Academic Bank of Credits.

gg) The Advanced Level/ Capstone Level Courses shall be designed in such a manner as to enable students to demonstrate their cumulative knowledge in their main field of study, which shall include advanced thematic specialization or internships or community engagement or services, vocational or professional training, or other kinds of work experience.

hh) Advanced/ Capstone level Major Specialization shall include Courses focused on a specific area of study attached to a specific Major, which could be an Elective Course. They shall include research methodology as well.

ii) The student has the option to register for and attend a course without taking part in the CCA and ESE of that course. Such a course is called the Audit Course. If the student has 75% attendance in an Audit Course, he/she/they is eligible for a pass in that course, without any credit (zero-credit). The Audit Course will be recorded in the final grade card of the student.

jj) All students shall undergo Summer Internship or Apprenticeship in a Firm, Industry or Organization; or Training in labs with faculty and researchers or other Higher Education Institutions (HEIs) or Research Institutions. A separate guideline for Internship Programmes will be published.

kk) Students will be provided the opportunities for internships with local industries, business organizations, agriculture, health and allied sectors, Local Government institutions (such as panchayats, municipalities), State Planning Board, State Councils/Boards, Research Institutions, Research Labs, Library, elected representatives to the parliament/state assembly/panchayath, media organizations, artists, crafts persons etc. These opportunities will enable the students to actively engage with the practical aspects of their learning and improve their employability.

ll) The College will assist in providing opportunities for field-based learning/minor Projects enabling them to understand the different socio-economic and development-related issues in rural and urban settings. The College will assist in providing the students with opportunities for Community engagement and services, exposing them to socio-economic issues to facilitate theoretical learning in real-life contexts.

mm) Additional Credits will be awarded for those who actively participate in Social Activities, which may include participation in National Service Scheme (NSS), Sports and Games, Arts, participation in University/ college union related activities (for respective elected/nominated members), National Cadet Corps (NCC), adult education/literacy initiatives, mentoring school students, and

engaging in similar social service organizations that deemed appropriate to the College.

nn) Grace marks shall be awarded to a student for meritorious achievements in co-curricular activities (in Sports/ Arts/ NSS/ NCC etc.). Such a benefit is applicable in the same academic year spreading over two semesters, in which the said meritorious achievements are earned. The Academic Council will decide from time to time the eligibility and other rules of awarding the grace marks.

oo) Options will be made available for students to earn credit by completing quality-assured remote learning modes, including Online programmes offered on the Study Webs of Active-Learning for Young Aspiring Minds (SWAYAM) or other Online Educational Platforms approved by the competent body from time to time.

pp) Students shall be entitled to gain credits from courses offered by other recognized institutions directly as well as through distance learning.

qq) For the effective operation of the FYUGP, a system of flexible academic transaction timings shall be implemented for the students and teachers.

rr) Specialization: Student will have the option to achieve specialization within their Major by securing 12 credits from a disciplinary/interdisciplinary area. By choosing atleast 3 courses from discipline specific elective basket under a chosen field (preferably one from 200 level course and two 300 level courses) student will be awarded specialization in that particular area of study. Each student will have the option to achieve two specializations at a time from the institution.

5. Eligibility for Admission and Reservation of Seats

i. The eligibility for admissions and reservation of seats for various FYUG Degree Programmes shall be in accordance with the norms/ rules made by the Government/University/College from time to time.

ii. No student shall be eligible for admission to FYUG Degree Programmes in any of the disciplines unless he/she/they have successfully completed the examination conducted by a Board/University at the Plus Two level of schooling or its equivalent.

iii. Students shall be admitted and enrolled in the respective programmes solely based on the availability of the academic and physical facilities within the institution. The College shall provide all students with a brochure detailing the Courses offered by the various departments under the various Programmes and the number of seats sanctioned for each Programme.

iv. During the time of admission each student may be provided with a unique higher

education student ID which may be linked with the Aadhar number of the students so that his ID can be transferred if required to other higher education institutions as well.

v. The students at the end of second semester may be permitted to change their major programme of study to any course/ institution/ university across the state. Based on the availability of seats and other facilities, the students may be permitted to opt any discipline which he/she/they had studied during the first two semesters as Discipline Specific Foundation courses/ Multidisciplinary Foundation courses. If ranking is required, it will be in the order of the highest-grade points secured in the discipline to which the switching of Major is sought.

vi. Students shall be allowed to change their major programmes, if required, to a maximum of 10% of the sanctioned strength of that particular programmes depending upon the academic and infrastructural facilities available in the Institution.

vii. Depending upon the availability of academic and infrastructural facilities, the Institution may also admit a certain number of students who are registered for particular programmes in each semester by transfer method, if required, from other Institutions subject to conditions as may be issued by the University.

viii. A student who has already successfully completed a First-Degree Programme and is desirous of and academically capable of pursuing another First-Degree Programme may also be admitted with the prior approval of the University as per the conditions regarding programme requirements specified by the University.

ix. A Student can also be admitted for an additional major/ second major/ additional minor and on completion of the required credits he/she/they can be awarded a second major/ additional major/ minor. He/she/they may be exempted from minor pathway and general foundation course requirement.

x. The HEIs can also enrol students in certain courses as per their choice depending upon the availability of infrastructure and other academic facilities from other recognized HEIs who are already registered for a particular programme there either through regular/online/distance mode irrespective of the nature of programme (Govt/ Aided/ Self- finance/ Autonomous). On successful completion of the course the credits may be transferred through the Academic Bank of Credit (ABC), against the unique higher education ID provided by the College at the time of admission.

6. Academic Monitoring and student Support

The academic monitoring and student support shall be in the following manner, namely

a) College should appoint a Senior Faculty member as Academic Co-

ordinator/Nodal officer for the smooth conduct of FYUGP.

b) Advisory System: There shall be one Senior Faculty Advisor (SFA) for each department and one Faculty Advisor (FA) for 20 to 30 students of the class to provide advice in all relevant matters. The Head of the Department, in consultation with the SFA, shall assign FA for each student.

c) The documents regarding all academic activities of students in a class shall be kept under the custody of the FA/SFA.

d) All requests/ applications from a student or parent to higher offices are to be forwarded/recommended by FA/SFA.

e) Students shall first approach their FA/ SFA for all kinds of advice, clarifications, and permissions on academic matters.

f) It is the official responsibility of the institution to provide the required guidance, clarifications, and advice to the students and parents strictly based on the prevailing academic regulations.

g) The SFA shall arrange separate or combined meetings with FA, faculty members, parents, and students as and when required and discuss the academic progress of students.

h) The FA/SFA shall also offer guidance and help to solve the issues on academic and non-academic matters, including personal issues of the students.

i)Regular advisory meetings shall be convened immediately after the commencement of the semester and immediately after announcing the marks of the Continuous Comprehensive Assessment (CCA).

j)The CCA related results shall be uploaded on the College portal only after displaying the same on the department notice board/other official digital platforms of the college at least for two working days.

i. Any concern raised by the students regarding CCA shall be looked into in the combined meetings of advisors, HoD, course faculty, and the students concerned.

ii. If the concerns are not resolved at the advisor's level, the same can be referred to the properly constituted department-level grievance redressal committees

iii. The HOD shall ensure the proper redressal of the concerns raised by the students regarding CCA.

k) If the students raise further concerns about the issue, the Principal shall refer the issue to the College-level grievance committee with proper documents and minutes of all the committees.

l) The FA/SFA shall be the custodian of the minutes and action taken reports of the advisory meetings. The SFA shall get the minutes and action taken reports of advisory meetings approved by the Head of Department and the Principal. It shall be the duty of the HoD and the Principal to produce them before the Governing body of the College as and when required.

m) The Principal shall inform/forward all regulations, guidelines, communications, announcements, etc. issued by the University regarding student academic and other matters to the HODs/ SFA for information and timely action.

n) It shall be the official responsibility of the Principal to extend the required administrative and financial support to the HODs, SFAs and FAs to arrange necessary orientation programmes for students regarding student counselling, the prevailing College norms, regulations, guidelines and procedures on all academic and other College related matters.

o) An integrated educational planning and administration software will be made available by the College to manage the academic information of all students. Which include student admissions and registration, managing student personal and academic information, course registrations, attendance management, all process related to assessments including regular & online examinations, grading, publishing of results, supplementary examinations, LMS, stakeholders' feedback, etc.

p) Faculty, staff, students, and parents shall be allowed to access this software system over a highly secure authenticated mechanism from within the campus and outside the campus.

7. Course Registration

a) Each department shall publish well in advance the relevant details of courses offered, such as the name, academic level, expected outcomes, time slot, and course faculty members.

b) Students shall be allowed to visit and interact with respective faculty members during the first week of each semester, to gather more information about the courses and the availability of seats.

c) Based on consultations and advice from the faculty adviser, each student shall complete course registration within one week from the commencement of each semester.

d) The number of credits that a student can take in a semester is governed by the provisions in these Regulations, subject to a minimum of 16 and a maximum of 30 Credits.

e) A student can opt out of a Course or Courses registered, subject to the minimum Credit/ Course requirement, if he/she/they feel that he/she/they has registered for more Courses than he/she/they can handle, within 30 days from the commencement of the semester. An option can be given to the student to convert this course as audit course if he/she/they wishes to do so.

f) The college shall publish a list of the students registered for each course including audit course, if any, along with the chosen Programmes, repeat/reappearance courses, if any, and shall forward the same to the university.

g) The higher education institutions shall admit candidates not only for programmes, but also for courses.

8. Re-admission and Scheme Migration

a) Students who opt out before the completion of the third year shall be provided with a 'Course cum Credits Certificate' after the successful completion of a semester as proof for re-entry to another institution.

b) Students who have successfully completed a particular programme pathway maybe permitted to take an additional minor or second major.

c) Those students who are opting for a second major are eligible for getting certain credit transfer/ credit exemption from their previous minor programs of study, subject to the prior recommendation of the BoS that, those credits are relevant for the present major programme of study.

9. Duration of Programmes, Credits Requirements and Options

a) Students will be offered the opportunity to take breaks during the programme and resume after the break, but the total duration for completing the FYUG programme shall not exceed 7 years.

b) Students who wish to complete the undergraduate programmes faster may do so by completing different courses equivalent to the required number of credits and fulfilling all other requirements in N-1 semesters, where N is the number of semesters in the FYUGP.

c) Provided further that the students may complete the undergraduate programme in slower pace, they may pursue the three years or six semester programme in 4 to 5 years (8 to 10 semesters), and four years, or eight semester programme in 5 to 6 years (10 to 12 semesters) without obtaining readmission.

d) For students who crossed 6 semesters at a slower space, the requirement of 16 credits per semester from the institutions where they enrolled may be relaxed.

10. Credit Structure

The proposed number of credits per course and the credit distribution of them for the FYUG Programmes are given below-

a) An academic year shall consist of 200 working days; one semester consists of 90 working days; and an academic year consists of two semesters.

b) Ten working days in a semester shall be used for extracurricular activities. One semester consists of 18 weeks with 5 working days per week. In each semester, 15 days (3 weeks) should be kept aside for End Semester Evaluation (ESE) and CCA.

c) The maximum number of available weeks for curriculum transactions should be fixed at 15 in each semester. A minimum of 5 teaching or tutorial hours could be made available for a day in a 5-day week.

d) A course that includes one hour of lecture/ tutorial or two hours of lab work/practical work/fieldwork/practicum per week is given one credit hour.

e) One credit in a semester should be designed for 15 hours of lectures/ tutorials or 30 hours of lab work/ practical work/ field work/ practicum and 30 hours of learner engagement in terms of course-related activities such as seminar preparation, assignment submission, etc.

f) A one-credit seminar or internship or studio activities or field work/ projects or community engagement and service will have two-hour engagements per week (30 hours of engagement per semester).

g) A course can have a combination of Lecture (L)/ Tutorial (T)/ Practicum or Practical (P)/ & Others (O) credits.

h) Minimum credit for one Course should be 2 (Two), and the maximum credit should be 4 (Four).

i) All Discipline Specific Major/Minor Courses shall be of 4 (Four) credits.

j) For all Discipline Specific Major/Minor Courses, there may be practical/ practicum.

k) All Courses under the Multi-Disciplinary, Ability Enhancement, Value Addition and Skill Enhancement categories are of 3 credits. Practical/Practicum credits can also be included in this category.

l) Summer Internship, Apprenticeship, Community Outreach activities, etc. may require sixty hours (or as appropriate) of engagement for acquiring one credit.

m) A student shall be able to opt for a certain number of extra credits over and above the requirements for the award of a degree.

n) Maximum number of credits that a student can earn per semester shall be restricted to 30. Hence, a student shall have the option of acquiring credits to a maximum of 180 credits for a 3-year (6-semester) UG programmes and 240 credits for a 4-year (8-semester) programmes.

o) Each faculty member shall offer a maximum of 16 credits per semester. However, those who are offering both practical and theory courses shall offer a maximum of 12-16 credits per semester.

p) For a four-credit theory course, 60 hours of lecture/ tutorial class shall be assured as a mandatory requirement for the completion of that course.

11. **Course Structure of the SACA-UGP Programmes**

The SACA-UGP consists of the following categories of courses and the minimum credit requirements for pathway option-one shall be as follows:

Sl. No.	Categorization of Courses for all Programmes	Minimum Number of Credit Required	
		3-yearUG	4-yearUG
1	Major	68	88
2	Minor	24	24+12*
3	Multi-Disciplinary Courses (MDC)	9	9
4	Skill Enhancement Courses (SEC)	9	9
5	Ability Enhancement Courses (AEC)	12	12
6	Value Addition Courses (VAC)	9	9
7	Summer Internship, field-based learning etc.	2	2
8	Research Project/Dissertation		12**
	Total Credits	**133**	**177**

*The students can acquire advanced/capstone level courses with 12 credits from their DSC/ DSE/ Minor courses depending upon their pathway choice. The Minor courses can be of level 300 or above.

** The students pursuing the 4-year honours with research have to complete a

capstone project with 12 credits and for the 4-year honours degree students have to complete a project with 12 credits. Those honours students who are not doing capstone project shall do three courses at the level 400 or above or three vocational training courses or internships for 12 credits.

a) 20% syllabus of each course will be prepared by the teacher as 'Teacher Specific Content' and will be evaluated under CCA.

b) In case of MDC, SEC, VAC courses coming under 3rd & 4th semester, college should make necessary arrangements to give adequate preference to courses designed by language departments. MDC in the 3rd semester can be Kerala Specific Content.

12. Academic Levels of Pathway Courses

Semester	Difficulty level	Nature of Course
1&2	100-199	Foundation level or introductory courses
3&4	200-299	Intermediate level courses
5&6	300-399	Higher level courses
7&8	400-499	Advanced/Capstone level courses

13. Signature Courses

a) With a prior recommendation of BoS and the approval of academic council, each faculty member can design and offer at least one signature course in every semester, which may be offered as DSE/SEC/VAC.

b) College may publish a list of their signature courses in DSE/ SEC/ VAC offered by their faculty members with a prior recommendation of BoS and the approval of Academic Council.

c) College may empanel distinguished individuals who have excelled in their field of specialization like science and technology, industry, commerce, social research, media, literature, fine arts, civil services etc. as adjunct faculty as per the UGC guidelines with the approval of the University/College. With a prior recommendation of BoS and the approval of academic council, the adjunct faculty can offer SEC/VAC as signature course.

d) Adhoc/ Guest faculty/ Visiting faculty/ Visiting Scholars can also offer DSE/SEC/ VAC as signature courses with a prior recommendation of BoS and the approval of academic council.

e) The faculty concerned may design the particular course and it should be forwarded to the BoS after the approval of department council.

f) The examinations and evaluation of the signature courses designed by the faculty shall be conducted by the faculty themselves and an external expert faculty chosen by the college from a panel of experts submitted by the faculty and recommend by the BoS concerned.

14. Programme Pathways and Curriculum Structure

Students who have joined for any programme under these regulations shall have the option to choose the following pathways for their UG degree and Honours programme.

i. **Degree with single Major**: A student pursuing the FYUG programme in a specific discipline shall be awarded a Major degree if he secures at least 50% of the total credits in the specific discipline required for the award of the Degree in that Discipline.
Example: Physics Major/Economics Major/Commerce Major

ii. **Degree Major with Minor**: If a student pursuing the FYUG Programme is awarded a Major Degree in a particular discipline, he/she/they are eligible to be awarded a Minor in another discipline of his choice, if he earns a minimum of 32 credits (approximately 25% of credit required for the three-year programme) from 8 pathway courses in that discipline.
Example: Physics Major with Chemistry Minor/ Chemistry Major with English Minor/ Commerce Major with Economics Minor/ English Major with Functional English Minor/Hindi Major with Malayalam Minor etc.

iii. **Major with Multiple Disciplines of Study**: This pathway is recommended for students who wish to develop core competencies in multiple disciplines of study. In this case, the credits for the minor pathway shall be distributed among the constituent disciplines/ subjects. If a student pursuing FYUG Degree Programme is awarded a major Degree in a particular discipline, he/she/they are eligible to get mentioned his core competencies in other disciplines of his choice if he has earned 12 credits from the pathway courses of that discipline.
Example: Physics Major with Minors in Chemistry and Mathematics, Economics Major with Minors in History and English, Commerce Major with Minors in Economics and Statistics.

iv. **Interdisciplinary Major**: For these programme pathways, the credits for the major and minor pathways shall be distributed among the constituent disciplines/subjects to attain core competence in the inter disciplinary programme.
Example: Econometrics Major, Global Studies Major, Biostatistics Major.

v. **Multi-Disciplinary Major**: For multidisciplinary major pathways, the credits for the major and minor pathways will be distributed among the broad disciplines such

as Life Sciences, Physical Sciences, Mathematical and Computer Sciences, Data Analysis, Social Sciences, Humanities, etc.
Example: Life Science, Data Science, Nano Science.

vi. **Degree with Double Major**: A student who secures a minimum of 50% credits from the first major will be awarded a second major in another discipline if he could secure 40% of credit from that discipline for the 3-year/ 4-year UG degree to be awarded a double major degree.
Example: Physics and Chemistry Major, Economics and History Major, Economics and History Major, Commerce and Management Major

Pathway Option1-Degree Major or Major with Multiple Disciplines of Study

Course Components	No. of Courses											
	Seme-ster 1	Seme-ster2	Seme-ster3	Seme-ster4		Seme-ster5#	Seme-ster6#	Total	Remarks	Seme-ster 7	Seme-ster 8	Total
DSCA (4 Credit/ Course)	1(P)	1(P)	3 (2P)	3 (2P)		5	4	17	7 Out of 17 can be opted as DSE	3	2	22
DSCB&C (4 Credit /Course)	2(P)	2(P)	1(P) (BorC)	1(P) (CorB)				6		3		9
Multidisciplinary Courses (MDC) (3 Credit/ Course)	1(P)	1(P)	1*					3	*Cannot opt from DSC			3
Ability Enhancement Courses (AEC) (3 Credit/ Course)	1 (English) 1 (OL)	1 (English)1 (OL)						4				4
Skill Enhancement Courses (SEC) (3 Credit/ Course)				1*		1**	1**	3	*Cannot opt from DSCA **From DSCA only			3
Value Addition Courses (VAC) (3 Credit/ Course)			1*	1*			1**	3	*Cannot opt from DSCA **From DSCA only			3
Project/ Dissertation 12 credits for Honours with Research & 8 for Honours											12 (1 DSC /DSE for Honours	
Total Courses	6	6	6	6		6	6	36		6	2+1	
Total Credits	21	21	22	22	2	23	22		Total Credits 133	24	20	Total Credits 177
Total Hours per Week	25	25	25	25		25	25		Exit option available	25	25	

Internship of 2 Credits

Pathway Option 2 – Major with Minor

Course Components	No. of Courses											Total
	Semester 1	Semester 2	Semester 3	Semester 4		Semester 5#	Semester 6#	Total	Remarks	Semester7	Semester8	
DSCA (4Credit/ Course)	1(P)	1(P)	3 (2P)	3 (2P)		4	3	15	7 Out of 15 can be opted as DSE	3	2	22
DSCB (4Credit/ Course)	2(P)	2(P)	1(P)	1(P)		1	1	8	1 Out of 8 can be opted as DSE	3		11
Multidisciplinary Courses (MDC)/ (3Credit/ Course)	1(P)	1(P)	1*					3	*Cannot opt from DSC			3
Ability Enhancement Courses (AEC) (3Credit/ Course)	1 (English)1 (OL)	1 (English) 1 (OL)						4				4
Skill Enhancement Courses (SEC) (3Credit/ Course)				1*		1**	1**	3	*Cannot opt from DSCA **From DSCA only			3
Value Addition Courses (VAC) (3 Credit/ Course)			1*	1*			1**	3	*Cannot opt from DSCA **From DSCA only			3
Project/ Dissertation 12 credits for Honours with Research & 8 for Honours											**12 (1DSC/ DSE for Honours**	
Total Courses	**6**	**6**	**6**	**6**		**6**	**6**	**36**		**6**	**2+1**	
Total Credits	**21**	**21**	**22**	**22**	**2**	**23**	**22**		**Total Credits 133**	**24**	**20**	**Total Credits 177**
Total Hours per Week	**25**	**25**	**25**	**25**		**25**	**25**		**Exit option available**	**25**	**25**	

Internship of 2 Credits

Pathway Option 3 – Double Major

Course Components	No. of Courses											Total
	Semester 1	Semester 2	Semester 3	Semester 4		Semester 5#	Semester 6#	Total	Remarks	Semester 7	Semester 8	
DSC A (4 Credit/ Course)	1(P)	1(P)	2(2P)	2(1P)		4	3	13	7 Out of 13 can be opted as DSE	3	2	18
DSC B (4 Credit/ Course)	2(P)	2(P)	2(1P)	2(2P)		1	1	10	2 Out of 10 can be opted as DSE	3		13
Multidisciplinary Courses (MDC) (3 Credit/ Course)	1(P)	1(P)	1*					3	*Cannot opt from DSC			3
Ability Enhancement Courses (AEC) (3 Credit/ Course)	1 (English)1 (OL)	1 (English) 1 (OL)						4				4
Skill Enhancement Courses (SEC) (3 Credit/ Course)				1		1	1	3				3
Value addition Courses (VAC) (3 Credit/ Course)			1	1			1	3				3
Project/Dissertation 12 credits for Honours with Research & 8 for Honours											**12 (1 DSC/DSE for Honours**	
Total Courses	**6**	**6**	**6**	**6**		**6**	**6**	**36**		**6**	**2+1**	
Total Credits	**21**	**21**	**22**	**22**	**2**	**23**	**22**		**TotalCredits133**	**24**	**20**	**Total Credits 177**
Total Hours per Week	**25**	**25**	**25**	**25**		**25**	**25**		**Exit option available**	**25**	**25**	

Internship of 2 Credits

15. Guidelines for Acquiring Credit from Other Institutions/Online/Distance Mode

a) A student shall register to a minimum of 16 credit per semester from the college/ department where he/ she/ they is officially admitted for a particular programme. However, students enrolled for a particular programme in one institution can simultaneously enrol for additional credits from other HEIs within the University or outside the University subject to a maximum of 30 credits per semester including the 16 institutional credits.

b) The College shall publish a list of courses that are open for admission for students from other institutions well in advance before the commencement of each semester.

c) Each BoS shall prepare and publish a list of online courses at different levels before the commencement of each semester offered in various online educational platforms recognized by the academic council of the College, which can be opted by the students for acquiring additional credits.

d) Each BoS shall prepare and publish a list of allied/relevant pathway courses before the commencement of each semester offered by other Board of Studies that can be considered as pathway courses for major/minor for their disciplines at different levels.

e) At the end of each, the semester College will include the credit acquired by the student through online courses in their semester grade cards subject to a maximum of 30 credits.

16 Attendance

i. A student shall be permitted to register for the end-semester evaluation of a specific course to acquire the credits only if he/ she has completed 75% of the prescribed classroom activities in physical, online, or blended modes, including any other activities as specified by the faculty coordinator of that particular course.

ii. A student is eligible for attendance as per the existing university and government orders which includes participation in a meeting, or events organized by the college or the university, a regularly scheduled curricular or extracurricular activity prescribed by the college or the university. Due to unavoidable or other legitimate circumstances such as illness, injury, family emergency, care-related responsibilities, bad or severe weather conditions, academic or career-related interviews, students are eligible for authorized absence. Apart from this, all other eligible leave such as maternity leave, and menstrual leave shall also be treated as authorized absences.

iii. The condonation facility can be availed as per the College norms.

17. Workload

i. The workload of a faculty who offers only lecture courses during an academic year shall be 32 credits.

ii. The workload of a faculty offering both practical courses and theory courses may be between 24-32 credits per academic year.

iii. An academic year shall consist of two semesters.

iv. To protect the existing language workload, college should make necessary arrangements to give adequate preference to those courses designed by language departments coming under MDC, SEC and VAC of 3^{rd} & 4^{th} semester.

v. Programme wise workload calculation will be as per the FYUGP workload ordinance 2024.

vi. The teachers given the administrative responsibilities in the department and college level may give a relaxation in their workload as specified in the UGC regulations 2018.

18. Credit Transfer and Credit Accumulation

i. College will establish a digital storage (DIGILOCKER) of academic credits for the credit accumulation and transfer in line with ABC.

ii. The validity of credits earned shall be for a maximum period of seven (7) years or as specified in the university/UGC regulations.

iii. The students shall be required to earn at least 50% of the credits from the College.

iv. Students shall be required to earn the required number of credits as per any of the pathway structure specified in this regulation for the award of the degree

19. Outcome Based Approach

The curriculum will be designed based on Outcome Based Education (OBE) practices. The Graduate Attributes (GA) and Programme Outcomes (PO) are provided in appendix-1. The OBE based syllabus template is provided in appendix-2.

20. Assessment and Evaluation

i. The assessment shall be a combination of Continuous Comprehensive Assessment (CCA) and an End Semester Evaluation (ESE).

ii. 30% weightage shall be given for CCA. The remaining 70% weight shall be for the ESE.

iii. Teacher Specific Content will be evaluated under CCA.

iv. CCA will have two subcomponents: Formative Assessment (FA) and Summative Assessment (SA). Each of these components will have equal weightage and must be conducted by the course faculty/course coordinator offering the course.

v. FA refers to a wide variety of methods that teachers use to conduct in-process evaluations of student comprehension, learning needs, and academic progress during a lesson, unit, module or course. FA is to encourage students to build on their strengths rather than fixate or dwell on their deficits. FA can help to clarify and calibrate learning expectations of students. FA will help students become more aware of their learning needs, strengths, and interests so they can take greater responsibility for their educational growth. FA will be the prerogative of the course faculty/course coordinator based on specific requirement of the student.

vi. Suggested methods of FA are as follows: (any one or in combination could be followed as decided by the course faculty/course coordinator)

   a. Practical assignment
   b. Observation of practical skills
   c. Viva voce
   d. Quiz
   e. Interview
   f. Oral presentations
   g. Computerized adaptive testing
   h. In-class discussions
   i. Group tutorial work
   j. Reflection writing assignments
   k. Home assignments
   l. Self and peer Assessments
   m. Any other method as may be required for specific course/student by the Course faculty/course coordinator

vii. Summative Assessments (SA) are used to evaluate student learning, skill acquisition, and academic achievement at the conclusion of a defined instructional period- typically at the end of a project, unit, module, course or semester. SA may be class tests, assignments, or project, used to determine whether students have learned what they were expected to learn. It will be based on evidence, collected using single or multiple ways of assessment. The systematically collected evidence should be kept in record by course faculty/course coordinator and the marks should be displayed on the college notice board/ other official digital platforms of the college before the end semester examinations

viii. The method of SA will be as follows: (any one as decided by the course faculty/course coordinator)

a. Written test
b. Open book test
c. Laboratory report
d. Problem based assignments
e. Individual project report
f. Case study report
g. Team project report
h. Literature survey
i. Standardized test
j. Any other pedagogic approach specifically designed for a particular course by the course faculty/course coordinator.

ix. A student may repeat SA only if there are any compulsive reasons due to which the student could not attend the assessment

x. The prerogative of arranging a CCA lies with the course faculty/course coordinator with the approval of SACA-UGP Academic Committee based on justified reasons

xi. The course faculty/ course coordinator shall be responsible for evaluating all the components of CCA. However, the university may involve any other person (External or Internal) for evaluation of any or all the components as decided by the Vice-Chancellor/Pro-Vice Chancellor from time to time in case any grievances are raised.

xii. Written tests shall be precisely designed using a variety of tools and processes (e.g., constructed responses, open-ended items, multiple-choice), and the students should be informed about the evaluation modalities before the commencement of the course.

xiii. The course faculty may provide options for students to improve their performance through continuous assessment mechanism.

xiv. There shall be theory and practical examinations at the end of each semester.

xv. Regarding evaluation, one credit may be evaluated for 25 marks in a semester; thus, a 4-credit course will be evaluated for 100 marks; and 2-credit courses for 50 marks. However, for tabulation purpose course with 1-credit will be evaluated for 50 marks and will be converted to 25 marks

xvi. Odd semester examinations will be conducted by the institution and will be evaluated at the institution level. However, even semester examinations will be conducted and evaluated by internal and external faculty.

xvii. Individual Learning Plans (ILPs) and/ or specific assessment arrangements may be put in place for differently abled students. Suitable evaluation strategies including technology assisted examinations/alternate examination strategies will be designed and implemented for differently abled students.

xviii. Distribution of CCA & ESE will be as given below

Credit	CCA	ESE
4	30	70
3	25	50
2	15	35

21. Practical Examination

i. The end semester practical examination will be conducted and evaluated by the institution.

ii. There shall be a CCA of practical courses conducted by the course faculty course coordinator.

iii. The scheme of evaluation of practical courses will be as given below:

Components for the Evaluation of Practical Courses	Weightage
CCA of practical/practicum.	30%
ESE conducted under the supervision of internal examiner	70%

iv. Those who have completed the CCA alone will be permitted to appear for the ESE.

v. For grievance redressal purposes, the university shall have the right to call for all the records of CCA.

vi. Duration of Examination

Questions shall be set as per the defined Outcome. The question setter shall ensure that there will be Time and Mode (T & M) flexibility for all External Examinations. BoS can recommend the T&M from the following list.

Mode	Time (in Hours)	
	Minimum	Maximum
Written Examination	1	2
Multiple Choice	1	1.5
Open Book	1	2
Any Other Mode	1	2

22. Evaluation of Project/Dissertation

The evaluation of project work shall be CCA with 30% and ESE 70%. The scheme of evaluation of the Project is given below

Components of Evaluation of Internship	Weightage	Marks for Internship 2 Credits / 50Marks
CCA	30%	15
ESE	70%	35

The department council may decide any mode for the completion of the Internship. If in case evaluation is not specified in any of the selected internship programme, institution can adopt a proper evaluation method as per the weightage specified in the table above.

23. Letter Grades and Grade Points

A Mark system is followed for evaluating each question. For each course in the semester, letter grades and grade points are introduced in a 10-point indirect grading system as per the guidelines given below,

i. The Semester Grade Point Average (SGPA) is computed from the grades as a measure of the student's performance in a given semester. The SGPA is based on the grades of the current term, while the Cumulative Grade Point Average (CGPA) is based on the grades in all courses taken after joining the programme of study.

ii. Based on the marks obtained, the weighted grade point will be mentioned in the student's grade cards.

Letter Grade	Grade Point	Percentage of Marks (Both Internal & External Marks put together)	Class
O (Outstanding)	10	95% and above	First Class with Distinction
A+ (Excellent)	9	Above 85% and below 95%	
A (Very good)	8	Above 75% and below 85%	
B+ (Good)	7	Above 65% and below 75%	First Class
B (Above average)	6	Above 55% and below 65%	
C (Average)	5	Above 45% and below 55%	Second Class
P(Pass)	4	Above 35% and below 45% Aggregate (external and internal put together) with a minimum of 30% in external	Third Class
F(Fail)	0	Below an aggregate of 35% or Below 30% in external evaluation	Fail
Ab (Absent)	0		Fail

iii. When students take audit courses, they may be given pass (P) or fail (F) grade without any credits

24. Computation of SGPA and CGPA

The following method is recommended to compute the Semester Grade Point Average (SGPA) and Cumulative Grade Point Average (CGPA):

i. The SGPA is the ratio of the sum of the product of the number of credits with the grade points scored by a student in all the courses taken by a student and the sum of the number of credits of all the courses undertaken by a student in the semester, i.e.

$$SGPA(S_i) = \frac{\sum(C_i \times G_i)}{\sum C_i}$$

Where S_i is the SGPA in the i^{th} semester, C_i is the number of credits of the i^{th}

course and G_i is the grade point scored by the student in the i[th] course.

$$\text{SGPA} = \frac{\text{Sum of the credit points of all the courses in a semesters}}{\text{Total Credits in that semester}}$$

Illustration–Computation of SGPA

Semester	**Course**	**Credit**	**Letter Grade**	**Grade point**	**Credit Point** (Credit Grade)
I	DSC A	4	A	8	4x8=32
I	DSC B	4	B+	7	4x7=28
I	DSC C	4	B	6	4x6=24
I	MDC	3	B	6	3x6=18
I	AEC 1	3	O	10	3x10=30
I	AEC 2	3	C	5	3x5=15
	Total	21			147
			SGPA		147/21=7

ii. The CGPA is also calculated in the same manner considering all the courses undertaken by a student over all the semesters of a programme i.e.

$$\textbf{CGPA} = \frac{\sum(C_i \times S_i)}{\sum C_i}$$

Where S_i is the SGPA in the i[th] semester, C_i is the total number of credits in the i[th] semester.

$$CGPA = \frac{Sum\ of\ the\ credits\ of\ all\ the\ courses\ in\ six/eight\ semesters}{Total\ Credits\ in\ Six(133)/Eight(177)\ semesters}$$

iii. The SGPA and CGPA shall be rounded off to 2 decimal points and reported in the transcripts.

25. Committees to be Constituted for the Implementation and Monitoring of SACA-UGP

i. There shall be a college level SACA-UGP Academic Co-ordinator/Nodal Officer, academic committee and SACA-UGP department committee in each department.

ii. The tenure of the college level committees will be 4 years.

SACA-UGP Academic Committee

i. The Principal (Chairman)

ii. Academic Co-ordinator/Nodal Officer (Convenor)

iii. All the Heads of Departments in the college

iv. Four teachers of the college representing different discipline nominated by the college council by rotation

v. Not less than four experts/academicians from outside the college representing areas such as Industry, Commerce, Education, Sciences etc., to be nominated by the college council preferably from the alumni of the college

vi. Three nominees of the affiliating University (not less than the designation of associate professor in a college/university department)

Functions of SACA-UGP Academic Committee

i. Scrutinize, approve, and recommend to the University all the proposals submitted by the department committee with regard to the SACA-UGP such as, academic pathway, allowed syllabi enrichment/updation, details of elective courses, Online courses, blended teaching, courses offering to the students of other HEIs, panel of examiners, summative and formative evaluation tools proposed by the concerned course faculty, new courses and syllabus proposed by the faculty members as signature courses etc. The Academic Committee can differ on any proposal, and it shall have the right to return the matter for reconsideration to the concerned Department committee or reject it, after giving sufficient reasons to do so.

ii. Scrutiny of all documents related to Teacher Specific Content.

iii. Recommend to the College Governing Body for starting innovative programmes using the flexibility and holistic nature of the SACA-UGP curriculum framework

SACA-UGP Department Committee

i) Head of the Department concerned (Chairman)

ii) The entire faculties of the Department

iii) Two subject experts from outside the college to be nominated by the MGU-UGP Academic Committee

iv) One representative from industry/ corporate sector/ allied area relating to placement

v) One meritorious alumnus of the department to be nominated by the department council

vi) The department council of the S A C A -UGP, may with the approval of the principal of the college, co-opt:

(a) Experts from outside the college whenever special courses of studies are to be formulated.

(b) Other faculty members of the same Faculty within the college

Functions of S A C A -UGP Department Committee

i) Prepare teacher specific content of syllabi for various courses keeping in view the objectives of the SACA-UGP and submit the same for the approval of the academic committee.

ii) Scrutinize the signature course content and its evaluation techniques.

iii) Suggest methodologies for innovative teaching and evaluation techniques.

iv) Suggest panel of examiners to the academic committee.

v) Coordinate research, teaching, extension and other academic activities in the department/college.

26. Proposed Options for Higher Studies for the Students of SACA-UGP

The following higher studies options at the level of post-graduation/research was described by UGC in the national higher education qualification framework;

i) The two-year master programme will continue (with an option of having the second year devoted entirely to research) for those who have completed a 3-year UG programme under the SACA-UGP regulations.

ii) For students who have completed a 4-year honours degree could complete their master programme within one year by acquiring the required credits as per the Post Graduate curriculum framework requirement.

iii) For enrolling in a PhD programme the candidate should have acquired a master degree or a 4-year honours degree with research.

28. Power to Remove Difficulties

If any difficulty arises in giving effect to the provisions of these Regulations, the Principal may by order make such provisions not inconsistent with the Act, Statutes, Ordinances or other Regulations, which appears to him to be necessary or expedient for removing the difficulty. Every order made under this rule shall be subject to ratification by the Governing body.

29. Modifications to the Regulations

Not with standing anything contained in these Regulations, any amendments or modifications issued or notified by the University Grants Commission or the State Government, from time to time, shall be deemed to have been incorporated into these Regulations and shall constitute an integral part thereof.

Appendix-1

Graduate Attributes (GA) of St. Albert's College (Autonomous)

The fundamental premise underlying the learning outcomes-based approach to curriculum planning and development is that, higher education qualifications are awarded on the basis of demonstrated achievement of outcomes (expressed in terms of knowledge, understanding, skills, attitudes and values) and academic standards expected. The expected learning outcomes are used as reference points that would help formulate graduate attributes, qualification descriptors, programme outcomes and course outcomes which in turn will help in curriculum planning and development, and in the design, delivery and review of academic programmes. The graduate attributes of St. Albert's College (Autonomous) are:

GA1: Critical thinking and Analytical reasoning

Capability to analyse and evaluate evidence, arguments, claims, beliefs on the basis of empirical evidence; identify relevant assumptions or implications; formulate coherent arguments; critically evaluate practices, policies and theories to develop knowledge and understanding; critical sensibility to lived experiences, with self-awareness and reflexivity of both self and society.

GA2: Scientific reasoning and Problem solving

Ability to analyse, interpret and draw conclusions from quantitative/qualitative data; and critically evaluate ideas, evidence and experiences from an open-minded and reasoned perspective; capacity to extrapolate from what one has learned and apply their competencies to solve different kinds of non-familiar problems, rather than replicate curriculum content knowledge; and apply one's learning to real life situations.

GA3: Multidisciplinary / interdisciplinary / trans disciplinary Approach

Acquire interdisciplinary / multidisciplinary / transdisciplinary knowledge base as a consequence of the learning they engage with their programme of study; develop a collaborative – multidisciplinary / interdisciplinary / transdisciplinary-approach to formulate constructive arguments and rational analysis for achieving common goals and objectives.

GA4: Intra and Interpersonal skills

Ability to work effectively and respectfully with diverse teams; facilitate cooperative or coordinated effort on the part of a group, and act together as a group or a team in the interests of a common cause and work efficiently as a member of a team; lead the team to guide people to the right destination, in a smooth and efficient way.

GA5: Digital literacy

Capability to use ICT in a variety of learning situations, demonstrate ability to access, evaluate, and use a variety of relevant information sources; and use appropriate software for analysis of data.

GA6: Global citizenship

Possess knowledge of the values and beliefs of multiple cultures and a global perspective; and capability to effectively engage in a multicultural society and interact respectfully with diverse groups.

GA7: Social Competency

Ability to contemplate on the impact of research findings on conventional practices, and a clear understanding of responsibility towards societal needs, and reaching the targets for attaining inclusive and sustainable development.

GA8: Equity, Inclusiveness and Sustainability

Appreciate equity, inclusiveness and sustainability and diversity; acquire ethical and moral reasoning and values of unity, secularism and national integration to enable to act as dignified citizens; able to understand and appreciate diversity (caste, ethnicity, gender and marginalization), managing diversity and use of an inclusive approach to the extent possible.

GA9: Lifelong Learning

Ability to acquire knowledge and skills, including learning how to gain knowledge, that are necessary for participating in learning activities throughout life, through self-paced and self-directed learning aimed at personal development, meeting economic, social and cultural objectives, and adapting to changing trades and demands of workplace through knowledge / skill development/ reskilling.

Programme Outcomes (PO)

PO1: Critical thinking and Analytical reasoning

Capability to analyse and evaluate evidence, arguments, claims, beliefs on the basis of empirical evidence; identify relevant assumptions or implications; formulate coherent arguments; critically evaluate practices, policies and theories to develop knowledge and understanding; critical sensibility to lived experiences, with self-awareness and reflexivity of both the self and the society.

PO2: Scientific reasoning and Problem solving

Ability to analyse, interpret and draw conclusions from quantitative/qualitative data; and critically evaluate ideas, evidence and experiences from an open-minded and reasoned perspective; capacity to extrapolate from what one has learned and apply their competencies to solve different kinds of non-familiar problems, rather than replicate curriculum content knowledge; and apply one's learning to real life situations.

PO3: Multi-disciplinary/interdisciplinary/transdisciplinary Approach

Acquire interdisciplinary/multidisciplinary/transdisciplinary knowledge base, as a result of the learning they engage within their programme of study; develop a collaborative-multidisciplinary/interdisciplinary/transdisciplinary-approach to formulate constructive arguments and rational analysis for achieving common goals and objectives.

PO4: Communication Skills

Ability to express thoughts and ideas effectively in writing and in speech; communicate with others using appropriate media; confidently share one's views and express herself/himself; demonstrate the ability to listen carefully, read and write analytically, and present complex information in a clear and concise manner to different groups.

PO5: Leadership Skills

Ability to work effectively and lead respectfully with diverse teams; setting direction, formulating an inspiring vision, building a team that can help achieve the vision, motivating and inspiring team members to engage with that vision, and using management skills to guide people to the right destination, in a smooth and efficient way.

PO6: Social Consciousness and Responsibility

Ability to contemplate on the impact of research findings on conventional practices, and a clear understanding of responsibility towards societal needs and reaching the targets for attaining inclusive and sustainable development.

PO7: Equity, Inclusiveness and Sustainability

Appreciate equity, inclusiveness and sustainability and diversity; acquire ethical and moral reasoning and values of unity, secularism and national integration to enable to act as dignified citizens; able to understand and appreciate diversity (caste, ethnicity, gender and marginalization), managing diversity and use of an inclusive approach to the extent possible.

PO8: Moral and Ethical Reasoning

Ability to embrace moral/ethical values in conducting one's life, formulate a position/argument about an ethical issue from multiple perspectives, and use ethical practices in all work. Capable of demonstrating the ability to identify ethical issues related to one's work, avoid unethical behaviour.

PO9: Networking and Collaboration

Acquire skills to be able to collaborate and network with educational institutions, research organisations and industrial units in India and abroad.

PO10: Lifelong Learning

Ability to acquire knowledge and skills, including "learning how to learn", that are necessary for participating in learning activities throughout life, through self-paced and self-directed learning aimed at personal development, meeting economic, social and cultural objectives, and adapting to changing trades and demands of workplace through knowledge/skill development/reskilling.

SYLLABUS INDEX

Name of the Minor: **Statistics+**

Semester 1

Course Code	Title of the Course	Type of the Course	Credit	Hours/ Week	Hour Distribution /week			
					L	T	P	O
24SACSTA1DB101 ***(Minor B)*** **24SACSTA1DC101** ***(Minor C)***	**Fundamentals of Statistics and Data Visualisation**	**Discipline Specific Component - DSC A**	**4**	**5**	**3**	**0**	**1**	**0**

Semester 2

Course Code	Title of the Course	Type of the Course	Credit	Hours/ Week	Hour Distribution /week			
					L	T	P	O
24SACSTA2DB101 ***(Minor B)*** **24SACSTA2DC101** ***(Minor C)***	**Introduction to Statistical Modelling**	**Discipline Specific Component - DSC A**	**4**	**5**	**3**	**0**	**1**	**0**

Semester 3

Course Code	Title of the Course	Type of the Course	Credit	Hours/ Week	Hour Distribution /week			
					L	T	P	O
24SACSTA3DB201(*Minor B)* 24SACSTA3DC201(*Minor C)*	Data Analysis in Inferential Statistics Using R/Python	Discipline Specific Component - DSC B/ DSC C	4	5	3	0	1	0
24SACSTA3MD201	Data Analysis Using R and Type Setting Using LaTex	MDC	3	4	2	0	1	0

Semester 4

Course Code	Title of the Course	Type of the Course	Credit	Hours/ Week	Hour Distribution /week			
					L	T	P	O
24SACSTA4DB201 *(Minor B)* 24SACSTA4DC201 *(Minor C)*	Data Analysis in Inferential Statistics Using R/Python	Discipline Specific Component - DSC B/ DSC C	4	5	3	0	1	0
24SACSTA4DB202 *(Minor B)* 24SACSTA4DC202 *(Minor C)*	Statistical Research Methods using Softwares.	Discipline Specific Component - DSC B/ DSC C	4	5	3	0	1	0
24SACSTA4SE201	Introduction to Spreadsheets and LaTex typing	SEC	3	3	1	0	1	0
24SACSTA4VA201	Ethical Dimensions in Statistical Machine Learning through R/Python	VAC	3	3	1	0	1	0

SEMESTER I

Course Code	Title of the Course	Type of the Course	Credit	Hours/ Week	Hour Distribution /week			
					L	T	P	O
24SACSTA1DB101 *(Minor B)* 24SACSTA1DC101 *(Minor C)*	Fundamentals of Statistics and Data Visualisation	Discipline Specific Component - DSC A	4	5	3	0	1	0

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Programme	**Statistics**					
Course Name	**Fundamentals of Statistics and Data Visualisation**					
Type of Course	**DSC A**					
Course Code	**24SACSTA1DB101*(Minor B)*** **24SACSTA1DC101*(Minor C)***					
Course Level	**100**					
Course Summary	This course helps to acquire basic knowledge of various types of data, probability theory, correlation, regression and their real world applications. Additionally, spreadsheet functions are used to address numerical challenges associated with the topics discussed.					
Semester	**1**	**Credits**			**4**	**Total Hours**
Course Details	**Learning Approach**	**Lecture**	**Tutorial**	**Practical**	**Others**	
		3		**1**		**75**
Pre-requisites, if any						

COURSE OUTCOMES (CO)

CO No.	Expected Course Outcome	Learning Domains *	PO No
1	Explain and understand the concepts of different types of data, sampling and sampling techniques.	U	1
2	Summarise data using various measures of central tendency, dispersion, skewness and kurtosis.	U	1
3	Analyse relationships between variables using scatter diagrams, correlation coefficients and regression analysis.	A,An	1
4	Develop skills in solving real- world problems through the application of regression techniques, particularly in predicting outcomes and understanding the limitations of predictions.	An,A	2,3
5	Understand basic probability concepts including random experiments, sample space and elementary ideas of probability.	U	2
6	Apply Bayes' theorem to update probabilities based on new information and evidence.	E	1
7	Understand how statistical concepts are relevant across disciplines, fostering interdisciplinary thinking.	U	2
8	Apply using spreadsheets to illustrate and analyse statistical concepts, enhancing practical skills.	A,An	2

Remember (K), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C), Skill (S), Interest (I) and Appreciation (Ap)

COURSE CONTENT

Content for Classroom transaction (Sub-units)

Module	Units	Course description	Hrs	CO No.
		Data and Variables, Measures of Central Tendency, Dispersion and Moments.	**15**	
	1.1	Types of data and variables: Concepts of primary data and secondary data, examples of univariate and	2	1

1		bivariate data type, Diagrams and Graphs: Bar diagrams, pie diagram and frequency graphs.		
	1.2	Scales of measurements: Ordinal, nominal, ratio and interval.	2	1,7
	1.3	Population and sample, Types of sampling: Non-probability and Probability sampling: Simple random sampling, systematic sampling, stratified random sampling and cluster sampling with real life examples (derivations not required).	3	2
	1.4	Measures of central tendency: Arithmetic Mean (AM), Geometric Mean (GM), Harmonic Mean (HM), median and mode (examples using raw data).	3	2
	1.5	Measures of dispersion: Range, Quartile Deviation (QD), Mean Deviation (MD) and Standard Deviation (SD), Coefficient of Variation (CV). (examples using raw data). Box Plot.	3	2
	1.6	Moments, skewness and kurtosis with examples using raw data. (derivations not required).	2	1,2

2		**Correlation and Regression**	**15**	
	2.1	Correlation, scatter diagram, Karl Pearson's correlation coefficient, Spearman's rank correlation coefficient. (Only the concepts, problems and properties-without proof of the above topics).	8	3
	2.2	Regression: Two types of regression lines, formula and numerical problems.	7	4,7
3		**Elementary Probability Theory**	**15**	
	3.1	Random experiment, sample space and event with examples.	4	5
	3.2	Elementary ideas of probability: Frequency, classical and axiomatic definitions with examples.	5	5
	3.3	Conditional probability, independence of events, total probability law, Bayes' theorem (without proof) with examples	6	5,6,7

4		**Problem Solving using Spreadsheets** (A practical record with minimum 5 problems has to be submitted).	**30**	
	4.1	Introduction to spreadsheet.	5	1
	4.2	Using spreadsheet, solve numerical problems associated with topics covered in various modules.	25	7,8
5		**Teacher Specific Content.**		

Teaching and Learning Approach	**Classroom Procedure (Mode of transaction)** Direct Instruction: Brainstorming lecture, E-learning, Interactive Instruction, Seminar, Group Assignments, Authentic learning, Presentation by students by group.
Assessment Types	**MODE OF ASSESSMENT** **A.Continuous Comprehensive Assessment (CCA)** ***Formative assessment*** **Theory: 20 marks** Quiz, Assignments **Practical: 5 marks** Lab involvement, Practical Record,Viva voce ***Summative assessment*** **Theory : 5 marks** Written tests
	B. End Semester Evaluation (ESE): (Theory based examination.)

Question Pattern

[Maximum Time 90 minutes, Maximum Marks 50]

Module	Part A	Part B	Part C	Total

	2 Marks	**6 Marks**	**12 Marks**	
I	4	2	1	**7**
II	3	2	1	**6**
III	3	2	0	**5**
IV	-	-	-	**-**
Total no of questions	**10**	**6**	**2**	**18**
Number of questions to be answered	**7**	**4**	**1**	**12**
Total Marks	14	24	12	50

i. Short answer type questions: Answer any 7 questions out of 10 (7*2=14)

ii. Short essay type questions: Answer any 4 questions out of 6 (4*6=24)

iii. Essay type questions: Answer any 1 question out of 2 (1*12=12)

Practical: 20 marks

Problem solving skills: 15 marks

Record: 5 marks

References:

1. Gupta, S. C. and Kapoor, V. K. (2020). Fundamentals of Mathematical Statistics, 12th Edition, Sultan Chand and Sons.

2. Gupta, S.P. (2021). Statistical Methods, 46th Edition, Sultan Chand and Sons: New Delhi.

3. Beverly J. Dretzke. (2008). Statistics with Microsoft Excel, 4th Edition, Pearson.

Suggested Readings:

1. Medhi, J. (2006). Statistical Methods, 2nd Edition, New Age International Publishers.

2. Mukhopadhyay, P. (1999). Applied Statistics, New Central Book Agency Private Limited, Kolkata

SEMESTER II

Course Code	Title of the Course	Type of the Course	Credit	Hours/ Week	Hour Distribution /week			
					L	T	P	O
24SACSTA2DB101 ***(Minor B)*** **24SACSTA2DC101** ***(Minor C)***	**Introduction to Statistical Modelling**	**Discipline Specific Component - DSC A**	**4**	**5**	**3**	**0**	**1**	**0**

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Programme	**Statistics**					
Course Name	**Introduction to Statistical Modelling**					
Type of Course	**DSC A**					
Course Code	**24SACSTA2DB101*(Minor B)*** **24SACSTA2DC101*(Minor C)***					
Course Level	**100**					
Course Summary	To acquire the basic knowledge of theory of random variables, various probability functions and their applications. Also spreadsheet functions are used to solve numerical problems associated with the topics discussed.					
Semester	**2**	**Credits**			**4**	**Total Hours**
Course Details	**Learning Approach**	**Lecture**	**Tutorial**	**Practical**	**Others**	
		3		**1**		**75**
Pre-requisites, if any						

COURSE OUTCOMES (CO)

CO No.	Expected Course Outcome	Learning Domains *	PO No
1	Examine major components of random variable theory and distribution theory.	U	1
2	Develop skills required to effectively understand various distributions.	S	2
3	Analyse several applications and advantages of distributions.	An	2
4	Evaluate fitting procedure of distribution and its simulation using spreadsheet.	A,E & S	2
Remember (K), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C), Skill (S), Interest (I) and Appreciation (Ap)			

COURSE CONTENT

Content for Classroom transaction (Units)

Module	Units	Course description	Hrs	CO No.
1		**Random Variable Theory**	**15**	
	1.1	Describe univariate random variables in discrete and continuous cases.	2	1
	1.2	Demonstrate probability mass function, probability density function and their properties, distribution function of a random variable: Definition and properties.	3	1
	1.3	Demonstrate functions of random variable, transformations of random variable (univariate).	2	1
	1.4	Describe bivariate random variable, demonstrate joint probability mass function, joint probability density function and their properties, describe joint distribution function and its properties.	4	1
	1.5	Demonstrate marginal and conditional distributions (bivariate case), demonstrate	4	1

		independence of random variables (bivariate case).		
2		**Mathematical Expectation**	**15**	
	2.1	Demonstrate mathematical expectation, its properties and simple problems.	4	1
	2.2	Describe Arithmetic Mean (AM), Geometric Mean (GM), Harmonic Mean (HM), Mean Deviation and Variance in terms of expectation and evaluate simple problems.	5	1
	2.3	Describe generating functions: Moment generating function, characteristic function, their properties and simple problems.	6	1
3		**Discrete and Continuos Distribution**	**15**	
	3.1	Discrete uniform distribution and Bernoulli distribution, explain binomial distribution and its properties, simple problems.	3	2
	3.2	Explain Poisson distribution and its properties, simple problems. Explain geometric distribution, its characteristics and lack of memory property.	4	2
	3.3	Explain continuous uniform distribution and its properties.	2	2
	3.4	Explain exponential distribution, gamma distribution and their characteristics. Lack of memory property of exponential distribution.	3	2
	3.5	Explain normal distribution and its properties. Discuss standard normal distribution and use of standard normal tables, problems.	3	3
4		**Spreadsheet for Statistical Computing** (A practical record with minimum 10 problems has to be submitted).	30	

	4.1	Use spreadsheet functions to solve numerical problems associated with topics covered in various modules.	30	4
5		**Teacher Specific Content.**		

Teaching and Learning Approach	**Classroom Procedure (Mode of transaction)** Direct Instruction: Brainstorming lecture, E-learning, Interactive Instruction, Seminar, Group Assignments, Authentic learning, Presentation by students by group.
Assessment Types	**MODE OF ASSESSMENT** **A. Continuous Comprehensive Assessment (CCA)** ***Formative assessment*** **Theory: 20 marks** Quiz, Assignments **Practical: 5 marks** Lab involvement, Practical Record,Viva voce ***Summative assessment*** **Theory : 5 marks** Written tests
	B. Semester End examination

Question Pattern

[Maximum Time 90 minutes, Maximum Marks 50]

Module	Part A	Part B	Part C	Total
	1 Marks (MCQ)	**5 Marks**	**10 Marks**	
I	7	2	-	**9**
II	7	2	1	**10**
III	6	2	1	**9**
IV	-	-	-	**-**

Total no of questions	**20**	**6**	**2**	**28**
Number of questions to be answered	**20**	**4**	**1**	**25**
Total Marks	20	20	10	50

i) Short answer type questions: Answer any 7 questions out of 10 (7*2=14).

ii) Short essay type questions: Answer any 4 questions out of 6 (4*6=24).

iii) Essay type questions: Answer any 1 question out of 2 (1*12=12).

Practical: 20 marks

Problem solving skills: 15 marks

Record: 5 marks

References

1. Mukhopadhaya, P. (1996). Mathematical Statistics. New Central Book Agency (P) Ltd., Calcutta.

2. Beverly J. Dretzke. (2008). Statistics with Microsoft Excel, Fourth Edition, Pearson.

3. Gupta, S.C. and Kapoor, V.K. (2002). Fundamentals of Mathematical Statistics. Sulthan Chand, New Delhi.

SUGGESTED READINGS

1. Bhat, B.R., Venkata Ramana, T. and Rao Madhava, K.S. (1977). Statistics: A Beginners Text Vol-2, New Age International (P) Ltd., New Delhi.

2. Goon, A. M., Gupta, N.K., and Das Gupta, B. (1999). Fundamentals of StatisticsVol.2. World Press, Kolkatha.

3. Rohatgi, V.K. and Saleh, A.M.E. (2001). An Introduction to Probability and Statistics. 2nd Edition. John Wiley & Sons, Inc, New York.

4. Wilks, S.S. (1964). Mathematical Statistics, John Wiley, New York.

SEMESTER III

Course Code	Title of the Course	Type of the Course	Credit	Hours/ Week	Hour Distribution /week			
					L	T	P	O
24SACSTA3DB201 ***(Minor B)*** **24SACSTA3DC201** ***(Minor C)***	**Data Analysis in Inferential Statistics Using R/Python**	**Discipline Specific Component - DSC B/ DSC C**	**4**	**5**	**3**	**0**	**1**	**0**
24SACSTA3MD201	**Data Analysis Using R and Type Setting Using LaTex**	**MDC**	**3**	**4**	**2**	**0**	**1**	**0**

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Programme	**Statistics**					
Course Name	**Data Analysis in Inferential Statistics Using R/Python**					
Type of Course	**DSC B**					
Course Code	**24SACSTA3DB201** ***(Minor B)*** **24SACSTA3DC201** ***(Minor C)***					
Course Level	**200**					
Course Summary	This course covers key concepts in Statistics including sampling distribution, estimation of parameters, testing of hypothesis and non-parametric tests. Emphasis is placed on practical applications using R or Python.					
Semester	**3**	**Credits**			**4**	**Total Hours**
Course Details	**Learning Approach**	**Lecture**	**Tutorial**	**Practical**	**Others**	
		3		**1**		**75**
Pre-requisites, if any	Level 100 knowledge of Statistics.					

COURSE OUTCOMES (CO)

CO No.	Expected Course Outcome	Learning Domains *	PO No
1	Understand different Sampling Distributions.	U	1
2	Describe estimation and methods.	U	1
3	Relate different parametric tests in testing the hypothesis.	An	1
4	Organise different non-parametric tests in testing the hypothesis.	An	1
5	Conduct data analysis using R/Python.	E	2

Remember (K), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C), Skill (S), Interest (I) and Appreciation (Ap)

COURSE CONTENT

Content for Classroom transaction (Units)

Module	Units	Course description	Hrs	CO No.
1		**Sampling Distribution**	**15**	
	1.1	Statistic, parameter.	2	1
	1.2	Distribution of sample mean and variance.	2	1
	1.3	Normal distribution, Student's t-distribution.	5	1
	1.4	Chi- square distribution, F distribution.	4	1
	1.5	Inter-relationship between Normal, t, Chi-square and F distributions.	2	1
2		**Statistical Inference**	**15**	
	2.1	Estimation, point estimation and interval estimation.	2	2

	2.2	Desirable properties of a good point estimator.	2	2
	2.3	Methods of estimation – MLE, Method of moments.	4	2
	2.4	Testing of hypothesis: Statistical test, null and alternative hypothesis, types of errors, significance level, power, critical region, p value.	3	3
	2.5	Parametric test: Testing of population mean (One sample and two sample) (z test, t-test), testing of population proportion (One sample and two sample), paired t test. ANOVA(one way only).	4	3
3		**Non- Parametric Tests**	**15**	
	3.1	Goodness of fit, Chi-Square test(independence of attributes).	4	4
	3.2	Sign test, median test.	5	4
	3.3	Kruskal Wallis H test, Wilcoxon test.	6	4
4		**Data Analysis using R /Python**	**30**	
	4.1	Introduction to R/Python.	6	5
	4.2	Categorical data analysis.	6	5
	4.3	Correlation and Regression.	8	5
	4.4	Testing, ANOVA (one-way classification). (A practical record with minimum 5 problems has to be submitted).	10	5
5		**Teacher Specifc Content.**		

<table>
<tr><td>Teaching and Learning Approach</td><td>Classroom Procedure (Mode of transaction)

Direct Instruction: Brainstorming lecture, E-learning, Interactive Instruction, Seminar, Group Assignments, Authentic learning, Presentation by students by group.</td></tr>
<tr><td>Assessment Types</td><td>MODE OF ASSESSMENT

A. Continuous Comprehensive Assessment (CCA)

Formative assessment

Theory: 20 marks

Quiz, Assignments

Practical: 5 marks

Lab involvement, Practical Record,Viva voce

Summative assessment

Theory : 5 marks

Written tests</td></tr>
<tr><td></td><td>B. Semester End examination

Question Pattern
[Maximum Time 90 minutes, Maximum Marks 50]

<table>
<tr><th>Module</th><th>Part A</th><th>Part B</th><th>Part C</th><th>Total</th></tr>
<tr><td></td><td>1 Mark (MCQ)</td><td>5 Marks</td><td>10 Marks</td><td></td></tr>
<tr><td>I</td><td>7</td><td>2</td><td>-</td><td>9</td></tr>
<tr><td>II</td><td>7</td><td>2</td><td>1</td><td>10</td></tr>
<tr><td>III</td><td>6</td><td>2</td><td>1</td><td>9</td></tr>
<tr><td>IV</td><td>-</td><td>-</td><td>-</td><td>-</td></tr>
<tr><td>Total no of</td><td>20</td><td>6</td><td>2</td><td>28</td></tr>
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questions				
Number of questions to be answered	**20**	**4**	**1**	**25**
Total Marks	20	20	10	50

i Short answer type questions: Answer any 7 questions out of 10 (7*2=14).

ii Short essay type questions: Answer any 4 questions out of 6 (4*6=24).

iii Essay type questions: Answer any 1 question out of 2 (1*12=12).

Practical: 20 marks

Problem solving skills: 15 marks

Record: 5 marks

References:

- Rohatgi V.K. and Saleh, A.K. Md.E. (2009): An Introduction to Probability andStatistics.2nd Edition. (Reprint)John Wiley andSons.
- Gupta,S.P. (2021) Statistical Methods. Sultan Chandand Sons: NewDelhi.
- Gupta,S.C.and Kapoor, V.K.(2020) Fundamentals of Mathematical Statistics, Sultan Chand and Sons.
- Sudha G Purohit, Sharad D. Gore, Shailaja Deshmukh (2019) Statistics using R, 2nd Edition, Narosa Publishing House.
- Python for Everybody: Exploring Data Using Python3, ADS 2016.

SUGGESTED READINGS:

1. Mood, A.M. Graybill, F.A. and Boes, D.C. (2007) Introduction to the Theory of Statistics,3rd Edition., (Reprint), Tata Mc Graw-Hill Pub. Co.Ltd.

2. John E Freund, Mathematical Statistics, Pearson Edn, NewDelhi

3. Tilman M. Davies. (2016) The Book of R, A First Course in Programming and Statistics, No Starch Press.

4. Python for Data Analysis (2012)WesMc Kinney, O'REILLY.

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Programme	**Statistics**					
Course Name	**Data Analysis Using R and Type Setting Using LaTex**					
Type of Course	**MDC**					
Course Code	**24SACSTA3MD201**					
Course Level	**200**					
Course Summary	This comprehensive course covers fundamental statistical analysis techniques, including generating frequency tables, conducting t-tests, chi square tests, ANOVA tests, and correlation analysis. Students will also learn advanced data visualisation skills using ggplot2, delve into principles of curve fitting and linear regression models, and gain proficiency in LaTeX typesetting for creating professional documents with tables, equations, images, and bibliographies. By the end of the course, students will be equipped with essential statistical analysis tools and LaTeX formatting skills to conduct data analysis and produce high-quality research documents.					
Semester	**3**	**Credits**			**3**	**Total Hours**
Course Details	**Learning Approach**	**Lecture**	**Tutorial**	**Practical**	**Others**	
		2	**0**	**1**	**0**	**45**
Pre-requisites, if any	Basic Knowledge in R programming					

COURSE OUTCOMES (CO)

CO No.	Expected Course Outcome	Learning Domains *	PO No
1	Analyse the information in the data using visual tools from R	An	1
2	Analyse the data using descriptive statistics tools in R	An	1
3	Perform basic inference tools in the data and arrive at conclusions about populations using R	An	2
4	Understand the Basic Typesetting using Latex	U	2
Remember (K), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C), Skill (S), Interest (I) and Appreciation (Ap)			

COURSE CONTENT

Content for Classroom transaction (Sub-units)

Module	Units	Course description	Hours	CO No.
		Data Visualization using R	**8**	
1	1.1	Introduction to R and importing data into R from Other formats.	3	1
	1.2	Introduction to various charts and Data Visualization using ggplot2 - histogram, Bar chart, line chart, bar chart, pie chart.	2	1
	1.3	Generating various charts using real time data.	2	1
	1.4	Generating frequency table and cross tables and summary measures using R.	1	1
2		**Inferential Statistics and Regression Analysis using R**	**16**	
	2.1	T-test (one sample, paired sample t-test, independent sample ttest) – Interpreting results, one way and	4	2

		two way ANOVA.		
	2.2	Assumptions of t-test and verifying the assumptions.	1	2
	2.3	Non-parametric analogues of t-test, one sample ANOVA, Chisquare test for independenc.	4	2
	2.4	Scatter diagram and correlation – Pearson and Spearman's Correlation in R.	2	3
	2.5	Regression Analysis in R – Linear and Multiple, Verifying the assumptions of Linear Regressions and Box Cox Transformations.	3	3
	2.6	Logistic Regression in R and interpreting results.	2	3
3		**Type Setting using Latex**	**21**	
	3.1	Introduction to LaTeX and typesetting: Understand the basics of LaTeX and its role in document preparation and Learn how to customise fonts and adjust the size of text in LaTeX documents.	4	4
	3.2	Explore different document classes and page styles available in LaTeX for various types of documents.	3	4
	3.3	Learn how to create a table of contents, index, and glossary in LaTeX for better document navigation.and Bibliography.	6	4
	3.4	Create lists with bullets and numbering, and format them effectively in LaTeX.	2	4
	3.5	Gain proficiency in creating tables, writing equations, and inserting images into LaTeX documents for comprehensive document	6	4

		preparation.		
4		**Teacher Specific Content.**		

Teaching and Learning Approach	**Classroom Procedure (Mode of transaction)** Direct Instruction: Brainstorming lecture, E-learning, Interactive Instruction, Seminar, Group Assignments, Authentic learning, Presentation by students by group.
Assessment Types	**MODE OF ASSESSMENT** **A. Continuous Comprehensive Assessment (CCA)** ***Formative assessment*** **Theory: 10 marks** Quiz, Assignments **Practical: 10 marks** Lab involvement, Practical Record,Viva voce ***Summative assessment*** **Theory: 5 marks** Written tests
	B. Semester End examination

Question Pattern
[Maximum Time 1 hour, Maximum Marks 35]

Module	Part A	Part B	Total
	1 Mark (MCQ)	**5 Marks**	
I	5	2	**7**

II	5	2	**7**
III	5	2	**7**
Total no of questions	**15**	**6**	**21**
Number of questions to be answered	**15**	**4**	**19**
Total Marks	15	20	35

References:

1. D Narayana, Sharad Ranjan, and Nupur Tyagi (2023), Basic Computational Techniques For Data Analysis, Routledge

2. Nussbaumer Knaflic, Cole(2015), Storytelling With Data: A Data Visualization Guide For Business Professionals, Wiley

3. Andy Field, Jeremy Miles, Zoe Field (2012) DISCOVERING STATISTICS USING R, Sage Publications

4. LATEX Tutorials : A PREMIER by Indian TEX Users Group, Edited by E. Krishnan, 2003. A free PDF document from the URL https://www.tug.org/twg/mactex/tutorials/ltxprimer-1.0.pdf

5. LATEX , a Document Preparation System by Leslie Lamport (second edition, Addison Wesley, 1994) 6. Hadley Wickham and Garrett Grolemund , R for Data Science

6. Hadley Wickham and Garrett Grolemund, R for Data Science

SEMESTER IV

Course Code	Title of the Course	Type of the Course	Credit	Hours/ Week	Hour Distribution /week			
					L	T	P	O
24SACSTA4DB201 *(Minor B)* 24SACSTA4DC201 *(Minor C)*	Data Analysis in Inferential Statistics Using R/Python	Discipline Specific Component - DSC B/ DSC C	4	5	3	0	1	0
24SACSTA4DB202 *(Minor B)* 24SACSTA4DC202 *(Minor C)*	Statistical Research Methods using Softwares.	Discipline Specific Component - DSC B/ DSC C	4	5	3	0	1	0
24SACSTA4SE201	Introduction to Spreadsheets and LaTex typing	SEC	3	3	1	0	1	0
24SACSTA4VA201	Ethical Dimensions in Statistical Machine Learning through R/Python	VAC	3	3	1	0	1	0

Department of Mathematics & Statistics
St. Albert's College (Autonomous) Ernakulam

Programme	**Statistics**					
Course Name	**Data Analysis in Inferential Statistics Using R/Python**					
Type of Course	**DSC B**					
Course Code	**24SACSTA4DB201*(Minor B)*** **24SACSTA4DC201*(Minor C)***					
Course Level	**200**					
Course Summary	This course covers key concepts in Statistics including sampling distribution, estimation of parameters, testing of hypothesis and non-parametric tests. Emphasis is placed on practical applications using R or Python.					
Semester	**4**	**Credits**			**4**	**Total Hours**
Course Details	**Learning Approach**	**Lecture**	**Tutorial**	**Practical**	**Others**	
		3		**1**		**75**
Pre-requisites, if any	Level 100 knowledge of Statistics.					

COURSE OUTCOMES (CO)

CO No.	Expected Course Outcome	Learning Domains *	PO No
1	Understand different Sampling Distributions.	U	1
2	Describe estimation and methods.	U	1
3	Relate different parametric tests in testing the hypothesis.	An	1
4	Organise different non-parametric tests in testing the hypothesis.	An	1
5	Conduct data analysis using R/Python.	E	2
Remember (K), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C), Skill (S), Interest (I) and Appreciation (Ap)			

COURSE CONTENT

Content for Classroom transaction (Units)

Module	Units	Course description	Hrs	CO No.
1		**Sampling Distribution**	**15**	
	1.1	Statistic, parameter.	2	1
	1.2	Distribution of sample mean and variance.	2	1
	1.3	Normal distribution, Student's t-distribution.	5	1
	1.4	Chi- square distribution, F distribution.	4	1
	1.5	Inter-relationship between Normal, t, Chi-square and F distributions.	2	1
2		**Statistical Inference**	**15**	
	2.1	Estimation, point estimation and interval estimation.	2	2

	2.2	Desirable properties of a good point estimator.	2	2
	2.3	Methods of estimation – MLE, Method of moments.	4	2
	2.4	Testing of hypothesis: Statistical test, null and alternative hypothesis, types of errors, significance level, power, critical region, p value.	3	3
	2.5	Parametric test: Testing of population mean (One sample and two sample) (z test, t-test), testing of population proportion (One sample and two sample), paired t test. ANOVA(one way only).	4	3
3		**Non- Parametric Tests**	**15**	
	3.1	Goodness of fit, Chi-Square test(independence of attributes).	4	4
	3.2	Sign test, median test.	5	4
	3.3	Kruskal Wallis H test, Wilcoxon test.	6	4
4		**Data Analysis using R /Python**	**30**	
	4.1	Introduction to R/Python.	6	5
	4.2	Categorical data analysis.	6	5
	4.3	Correlation and Regression.	8	5
	4.4	Testing, ANOVA (one-way classification). (A practical record with minimum 5 problems has to be submitted).	10	5
5		**Teacher Specifc Content.**		

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Direct Instruction: Brainstorming lecture, E-learning, Interactive Instruction, Seminar, Group Assignments, Authentic learning, Presentation by students by group.</td></tr>
<tr><td>Assessment Types</td><td>MODE OF ASSESSMENT

A. Continuous Comprehensive Assessment (CCA)

Formative assessment

Theory: 20 marks

Quiz, Assignments

Practical: 5 marks

Lab involvement, Practical Record,Viva voce

Summative assessment

Theory : 5 marks

Written tests</td></tr>
<tr><td></td><td>B. Semester End examination
<table>
<tr><th colspan="5">Question Pattern
[Maximum Time 90 minutes, Maximum Marks 50]</th></tr>
<tr><td rowspan="2">Module</td><td>Part A</td><td>Part B</td><td>Part C</td><td rowspan="2">Total</td></tr>
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<tr><td>Total no of</td><td>20</td><td>6</td><td>2</td><td>28</td></tr>
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</table>

questions				
Number of questions to be answered	**20**	**4**	**1**	**25**
Total Marks	20	20	10	50

i Short answer type questions: Answer any 7 questions out of 10 (7*2=14).

ii Short essay type questions: Answer any 4 questions out of 6 (4*6=24).

iii Essay type questions: Answer any 1 question out of 2 (1*12=12).

Practical: 20 marks

Problem solving skills: 15 marks

Record: 5 marks

REFERENCES:

- Rohatgi V.K. and Saleh, A.K. Md.E. (2009): An Introduction to Probability andStatistics.2nd Edition. (Reprint)John Wiley andSons.
- Gupta,S.P. (2021) Statistical Methods. Sultan Chandand Sons: NewDelhi.
- Gupta,S.C.and Kapoor, V.K.(2020) Fundamentals of Mathematical Statistics, Sultan Chand and Sons.
- Sudha G Purohit, Sharad D. Gore, Shailaja Deshmukh (2019) Statistics using R, 2nd Edition, Narosa Publishing House.
- Python for Everybody: Exploring Data Using Python3, ADS 2016.

SUGGESTED READINGS:

- Mood, A.M. Graybill, F.A. and Boes, D.C. (2007) Introduction to the Theory of Statistics,3rd Edition., (Reprint), Tata Mc Graw-Hill Pub. Co.Ltd.
- John E Freund, Mathematical Statistics, Pearson Edn, NewDelhi

- Tilman M. Davies. (2016) The Book of R, A First Course in Programming and Statistics, No Starch Press.
- Python for Data Analysis (2012)WesMc Kinney, O'REILLY.

Department of Mathematics & Statistics
St. Albert's College (Autonomous) Ernakulam

Programme	**Statistics**					
Course Name	**Statistical Research Methods using Softwares.**					
Type of Course	**DSC B**					
Course Code	**24SACSTA4DB202*(Minor B)*** **24SACSTA4DC202*(Minor C)***					
Course Level	**200**					
Course Summary	This course aims to equip students with a solid foundation in Research Methodology, Statistical Testing and Data Analysis					
Semester	**4**	**Credits**			**4**	**Total Hours**
Course Details	**Learning Approach**	**Lecture**	**Tutorial**	**Practical**	**Others**	
		3		**1**		**75**
Pre-requisites, if any	Level 100 knowledge of Statistics					

COURSE OUTCOMES (CO)

CO No.	Expected Course Outcome	Learning Domains *	PO No
1	Understand different research methods in social science	U	1
2	Understand the statistical testing procedure in sociology	U	1

3	Illustrate the large sample tests	A	2
4	Describe the small sample tests	A	2
5	Conduct a social survey and data analysis using R/Python/Spreadsheet.	E	2
Remember (K), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C), Skill (S), Interest (I) and Appreciation (Ap)			

COURSE CONTENT

Content for Classroom transaction (Sub-units)

Module	Units	Course description	Hours	CO No.
		Introduction to Research Methodology	**15**	
1	1.1	Research design, Qualitative and quantitative research.	3	1
	1.2	Data collection methods & sampling techniques.	5	1
	1.3	Research reporting and Communication-Writing Research proposal	4	1
	1.4	Apply research methods to real-world social issues.	3	
2		**Testing of Hypothesis**	**10**	
	2.1	Parameter, statistic.	1	2
	2.2	Statistical hypothesis, Simple and composite hypothesis	1	2
	2.3	Null and alternative hypotheses, type I and type II Errors.	2	2
	2.4	Critical region, size of the test, p value, power.	2	2
	2.5	Sociological research problems in Statistical perspective.	4	2

3		**Parametric and Non-parametric Tests**	**20**	
	3.1	Large sample test: z test for single mean and equality of two means	5	2
	3.2	Small sample test: t test for single mean and equality of two means, paired t test	5	3
	3.3	ANOVA (one way only).	1	3
	3.4	Non- parametric tests: Testing association of attributes using Chi square test	2	4
	3.5	Sign test, median test, Wilcoxon Ranked test-simple problems only	6	4
	3.6	Applicaions of statistical tests in various fields.	1	4
		Data analysis using R/spreadsheet/Python	**30**	
	4.1	Conduct a social survey and prepare a project report (Questionnaire, geographical and diagrammatic representation, analysis - Descriptive Statistics)	12	5
	4.2	Statistical analysis and interpretation of a social problem by using Spreadsheet/ Python/ R programming.	18	5
Module 5		**Teacher Specific Content.**		

Teaching and Learning Approach	**Classroom Procedure (Mode of transaction)** Direct Instruction: Brainstorming lecture, E-learning, Interactive Instruction, Seminar, Group Assignments, Authentic learning, Presentation by students by group.

<table>
<tr><td>Assessment Types</td><td>

MODE OF ASSESSMENT

A. Continuous Comprehensive Assessment (CCA)

Formative assessment

Theory: 20 marks

Quiz, Assignments

Practical: 5 marks

Lab involvement, Practical Record,Viva voce

Summative assessment

Theory : 5 marks

Written tests

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B. End Semester Evaluation (ESE):

Question Pattern

[Maximum Time 90 minutes, Maximum Marks 50]

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	be answered				
	Total Marks	20	20	10	50

i. Short answer type questions: Answer any 7 questions out of 10 (7*2=14)

ii. Short essay type questions: Answer any 4 questions out of 6 (4*6=24)

iii. Essay type questions: Answer any 1 question out of 2 (1*12=12)

Practical: 20 marks

Problem solving skills: 15 marks

Record: 5 marks

References

1. Rohatgi V.K. and Saleh, A.K. Md.E. (2009). An Introduction to Probability andStatistics.2nd Edition. (Reprint)John Wiley andSons.

2. Gupta, S.P. (2021). Statistical Methods. Sultan Chandand Sons: NewDelhi.

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Statistics, No Starch Press.

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Department of Mathematics & Statistics
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Programme	**Statistics**					
Course Name	**Introduction to Spreadsheets and LaTex typing**					
Type of Course	**SEC**					
Course Code	**24SACSTA4SE201**					
Course Level	**200**					
Course Summary	To get basic knowledge and skills of data analysis using spreadsheets and be able to create printed materials with professional quality using LaTex.					
Semester	**4**	**Credits**			**3**	**Total Hours**
Course Details	**Learning Approach**	**Lecture**	**Tutorial**	**Practical**	**Others**	
		1	**0**	**1**	**0**	**45**
Pre-requisites, if any	Level 100 knowledge in Statistics /Computer					

COURSE OUTCOMES (CO)

CO No.	Expected Course Outcome	Learning Domains *	PO No
1	Illustrate how to present data in a presentable format using pictures, tables and create well-presented	U	1

	documents.		
2	Analyze the data and compare the distributions with statistical believes.	A	2
3	Elucidate new conclusions, if any, shown by the data based on the thorough analysis.	Ap	2
4	Critically examine and compare the results of the data analysis.	A	2
5	Describe the data based on the analysis using the spreadsheet.	U	1
6	Explain how to create documents and powerpoints.	U	1
7	Build documents using LaTex.	C	1
8	Appraise the need for presenting data and documents suitable for different situations.	E	2
Remember (K), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C), Skill (S), Interest (I) and Appreciation (Ap)			

COURSE CONTENT

Content for Classroom transaction (Sub-units)

Module	Units	Course description	Hours	CO No.
1		**Spreadsheet and Data**	**15**	
	1.1	Basics of spreadsheet and data types, creation of worksheets, editing, formatting and saving.	3	1
	1.2	Introduction to functions in a spreadsheet, if function, freeze panes, vlookup, hlookup, sorting, filtering.	5	1,2

	1.3	Pivot tables, Statistics in spreadsheets, conditional formatting,data validation.	4	2,3,4
	1.4	Data visualisation, Statistical analysis using spreadsheets.	3	4,5
2		**Basics of LaTex**	**15**	
	2.1	Introduction to LaTex interfaces, understanding Latex compilation, basic syntax.	3	7
	2.2	Writing equations, matrices, tables. Page Layout: Titles,abstract,chapters,sections,references ,equatio references, citation.List Making Environments.	4	7
	2.3	Table of contents, generating commands, figure handling numbering, list of figures,list of tables, generating index.	3	7
	2.4	Classes: Article, book, report, beamer, slides. Applicationsto: Writing articles / Projects.	3	7,8
	2.5	Presentation using beamer.	2	6,8
3	3.1	Statistical Computing using spreadsheet and LaTex. (Exercises based on the above concepts. Both spreadsheet & LaTex).	**15**	2,6,7,8
4	4.1	Teacher Specific Content.		

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A. Continuous Comprehensive Assessment (CCA)

Formative assessment

Theory: 10 marks

Quiz, Assignments

Practical: 10 marks

Lab involvement, Practical Record,Viva voce

Summative assessment

Theory: 5 marks

Written tests</td></tr>
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<table>
<tr><td colspan="4">Question Pattern
[Maximum Time 1 hour, Maximum Marks 35]</td></tr>
<tr><td rowspan="2">Module</td><td>Part A</td><td>Part B</td><td rowspan="2">Total</td></tr>
<tr><td>1 Mark (MCQ)</td><td>5 Marks</td></tr>
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	Number of questions to be answered	**15**	**4**	**19**
	Total Marks	15	20	35

References:

1. Excel 2022: From Basic to Advanced. (2022). George Wahlberg.
2. Stefan Kottwitz: LATEX Cookbook. (2015). Packt Publishing.
3. David F. Griffths and Desmond J. Higham. (2016). Learning LATEX (2nd edition) Siam.

Suggested Readings:

1. Excel Formulas and Functions. (2020). Basics: Step-by-Step Guide with Examples for Beginners (Excel Academy Book 2) Adam Ramirez .
2. Excel 2022 : Three books-in-one: a to z mastery guide on excel basic operations, excel formulas, functions, pivot tables & dashboards (2022). Joe Webinar.
3. M.R.C. van Dongen:LATEX and Friends (2012). Springer-Verlag Berlin Heidelberg.

Department of Mathematics & Statistics
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Programme	**Statistics**					
Course Name	**Ethical Dimensions in Statistical Machine Learning through R/Python**					
Type of Course	**VAC**					
Course Code	**24SACSTA4VA201**					
Course Level	**200**					
Course Summary	The course delves into the crucial intersection of ethics and data analysis tools. Students examine real-world ethical dilemmas and learn strategies to mitigate biases and ensure responsible data handling within software-driven analyses. The course also gives an introduction to statistical machine learning and enables the student to up-skill his technical presentation skills.					
Semester	**4**	**Credits**			**3**	**Total Hours**
Course Details	**Learning Approach**	**Lecture**	**Tutorial**	**Practical**	**Others**	
		1	**0**	**1**	**0**	**45**
Pre-requisites, if any	Level 100 knowledge in Statistics /Computer					

COURSE OUTCOMES (CO)

CO No.	Expected Course Outcome	Learning Domains *	PO No
1	To critically analyze summarising data and testing a hypothesis.	An	1
2	To familiarise the basic concepts of model building and Statistical Machine Learning.	S	2
3	To articulate and present, both orally and in written form, the ethical implications of real life data using R/Python.	Ap	8
Remember (K), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C), Skill (S), Interest (I) and Appreciation (Ap)			

COURSE CONTENT

Content for Classroom transaction (Sub-units)

Module	Units	Course description	Hours	CO No.
1		**Foundation of Data Analysis and Ethical Framework**	**15**	
	1.1	Basic on data collection, questionnaire preparation, interview methods for collecting data, organising and cleaning data.	2	1
	1.2	Descriptive statistics, correlation and scatter plot. Visualisation of data: Histogram, frequency polygon and ogives.	3	1
	1.3	Theory of attributes: Introduction, independence of attributes, criterion of independence, association of attributes, Yule's coefficient of association and coefficient of colligation.	4	1

	1.4	Small sample tests: t test and F test-t test of significance for single mean, difference in means, paired t - test for related samples, F test of significance for equality of population variances, chi- square test.	6	1
2		**Introduction to Model Building and Statistical Machine Learning**	**15**	
	2.1	Regression, simple linear regression, multiple linear regression and logistic regression.	4	1, 2
	2.2	Bayesian inference: Prior, posterior, map, regularisation in Bayesian setup, introduction to mcmc (markov chain monte carlo).	5	2
	2.3	Classification, introduction, example of supervised learning, classification model, classification learning steps, common classification algorithms- KNN, decision tree, random forest models, support vector machine.	6	2
3		**Ethical Decision Making and Communication in Data Analysis**	**15**	
	3.1	Ethical theories and principles in data science, group discussions on ethical frameworks and their applications in data analysis.	**6**	3
	3.2	Introduction to R/ Python.	**4**	1,3
	3.3	Presentation on the implemented data analysis using real life data using R/Python.	**5**	1,2,3
4	4.1	Teacher Specific Content.		

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A. Continuous Comprehensive Assessment (CCA)

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Quiz, Assignments

Practical: 10 marks

Lab involvement, Practical Record,Viva voce

Summative assessment

Theory: 5 marks

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References:

1. Wickham, Hadley, Mine Çetinkaya-Rundel, and Garrett Grolemund.(2023). R for data science. " O'Reilly Media, Inc.".
2. V.K.Kapoor and S.C.Gupta (2010). Fundamentals of Mathematical Statistics, Sultan Chand & Sons, New Delhi.
3. Chiang, Chin Long.(2003). Statistical methods of analysis. World Scientific.

Suggested Readings:

1. Davis, Kord. (2012). Ethics of Big Data: Balancing risk and innovation." O'Reilly Media, Inc.".
2. Powers, Daniel, and Yu Xie.(2008). Statistical methods for categorical data analysis. Emerald Group Publishing.
3. Sugiyama, Masashi.(2015). Introduction to statistical machine learning. Morgan Kaufmann.