



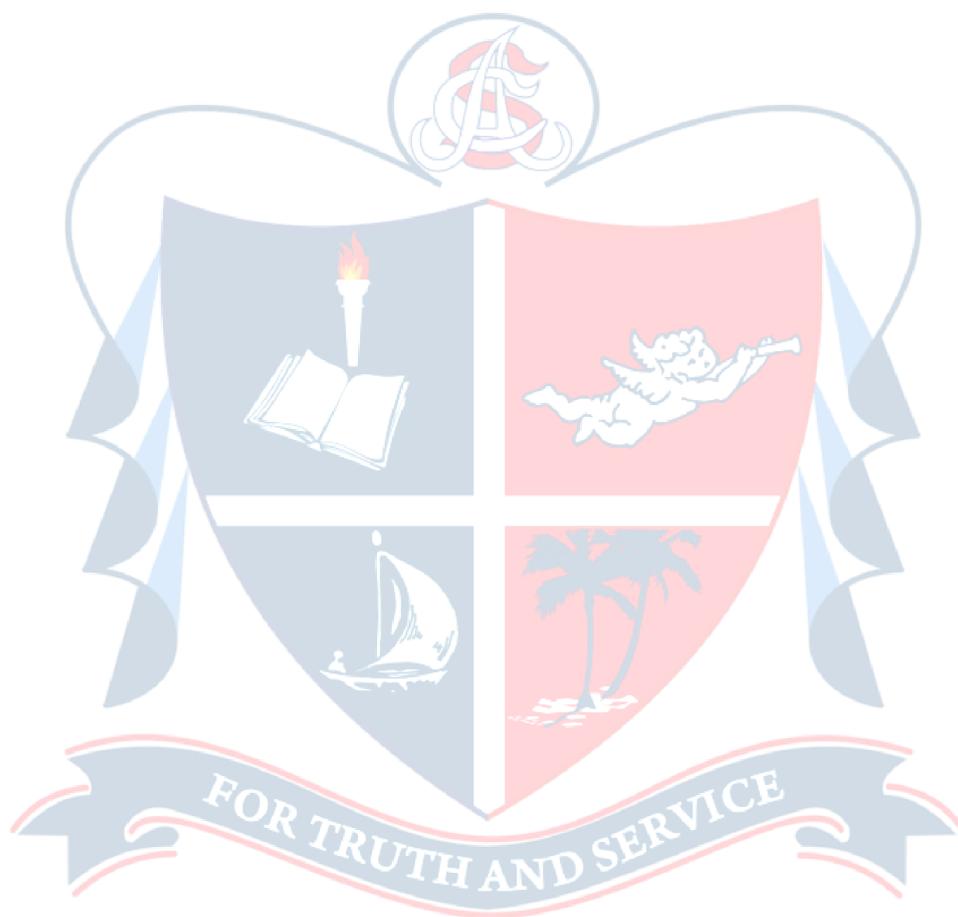
**ST. ALBERT'S COLLEGE (AUTONOMOUS)  
ERNAKULAM**

**Affiliated to Mahatma Gandhi University, Kottayam, Kerala**

**SYLLABUS FOR UNDERGRADUATE PROGRAMME**

**BACHELOR OF SCIENCE (HONOURS) BIOCHEMISTRY**

**SACA – UGP  
(WITH EFFECT FROM 2024 ADMISSION)**



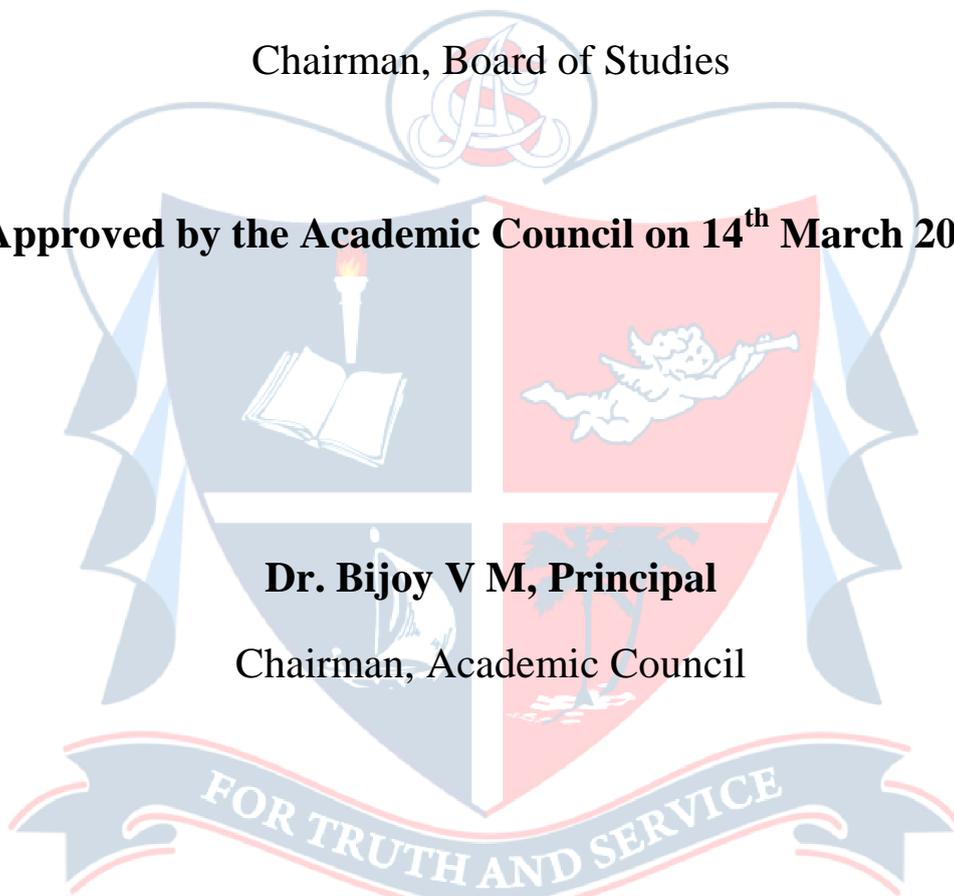
## **Syllabus of B.Sc. (Honours) Biochemistry**

**Proposed by the Board of Studies on 29<sup>th</sup> February 2024**

**Dr. Vibin M**

Chairman, Board of Studies

**Approved by the Academic Council on 14<sup>th</sup> March 2024**



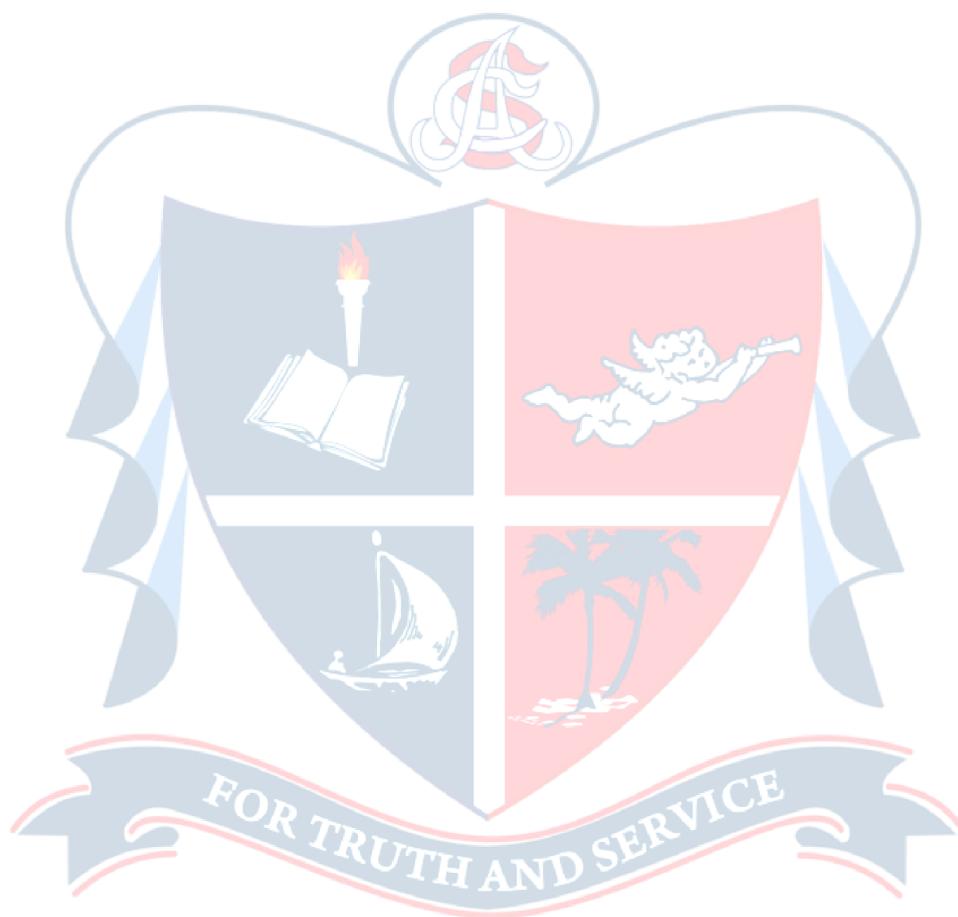
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Chairman, Academic Council

**Adopted by the Governing Council on 27<sup>th</sup> March 2024**

**Rev. Fr. Dr. Antony Thoppil**

Chairman, Governing Council



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## Preface

Biochemistry is a multidisciplinary science that investigates the chemistry of living organisms and the molecular mechanisms underlying changes in living cells. It is the most comprehensive of the basic sciences, encompassing various subspecialties such as neurochemistry, bioorganic chemistry, clinical biochemistry, physical biochemistry, molecular genetics, biochemical pharmacology, and immunochemistry. Recent advancements in these areas have forged connections between technology, chemical engineering, and biochemistry. By employing methods from chemistry, physics, molecular biology, and immunology, biochemistry examines the structure and behavior of complex molecules in biological material, studying how these molecules interact and communicate within and between cells and organs. Biochemists aim to understand the functions of specific molecules like proteins, nucleic acids, lipids, vitamins, and hormones in biological processes.

Biochemistry has provided insights into the causes of many diseases in humans, animals, and plants, often suggesting methods for treatment or cure. It also delves into the intricate chemical reactions in various life forms, laying the groundwork for practical advances in medicine, veterinary medicine, agriculture, and biotechnology. Biochemistry encompasses and underpins emerging fields like molecular genetics and bioengineering.

The new curriculum for the Undergraduate Programme in Biochemistry (B.Sc. Biochemistry Honours) offers a focused, outcome-based syllabus at the Honours level, providing structured teaching and learning experiences tailored to student needs. The curriculum includes Foundation courses, Discipline-Specific Courses, and Discipline-Specific Capstone courses. Foundation courses comprise Ability Enhancement Courses, Skill Enhancement Courses, Value Addition Courses, and Multi-disciplinary Courses.

The approved curricular framework by the Higher Education Department, Government of Kerala, and Kerala State Higher Education Council in accordance with the UGC guidelines 2023, aims to provide students with a comprehensive understanding of the fundamentals, practical training, and application of subject knowledge in various areas of Biochemistry, equipping them with the necessary knowledge, skills, and personality traits.

# 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

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

#### 2. Scope, Application

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.

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:

- i. 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.
- ii. 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.

- iii. 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).
- iv. 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.
- v. 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.
- vi. Students who acquire minimum 75% in their graduation (upto 6<sup>th</sup> 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.
- vii. 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.
- viii. 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
- ix. Students who have chosen the honours with research stream shall do their entire fourth year under the mentorship of a mentor.
- x. 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.
- xi. 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.
- xii. The research outcomes of their project work may be published in peer-reviewed journals or presented at conferences or seminars or patented.
- xiii. The proposed FYUGP curriculum comprises three broad parts: a) Foundation Components, b) Discipline Specific Pathway components (Major/ Minor), and c) Discipline Specific Capstone Components.

- xiv. The Foundation component of the FYUGP shall consist of a Set of General Foundation Courses and a Set of Discipline Specific Foundation Courses.
- xv. 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).
- xvi. 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.
- xvii. 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.
- xviii. 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.
- xix. Skill Enhancement Courses (SEC) shall be designed to enhance 21<sup>st</sup> century workplace skills such as creativity, critical thinking, communication, and collaboration.
- xx. Discipline Specific Courses shall include Discipline Specific Pathway Courses, both Major and Minor streams, enabling students to gain basic knowledge in the chosen discipline.
- xxi. 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.
- xxii. 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).
- xxiii. Value Addition Courses (VAC) shall be so designed as to empower the students with personality development, perspective building, and self-awareness.
- xxiv. 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.
- xxv. Major components consist of three types: Discipline Specific Core or the Discipline Specific Elective Courses, and the research/laboratory/fieldwork.
- xxvi. Minor Courses can be selected from any discipline. A student who completes 12 credits in a particular stream will be eligible for a minor.

- xxvii. 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.
- xxviii. 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.
- xxix. 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.
- xxx. 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.
- xxxi. Students should opt their 5<sup>th</sup> and 6<sup>th</sup> semester VAC and SEC from their Major disciplines only.
- xxxii. 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.
- xxxiii. 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.
- xxxiv. 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.
- xxxv. 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.
- xxxvi. 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.
- xxxvii. 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.
- xxxviii. 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.

- xxxix. 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.
- xl. 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.
- xli. 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.
- xlii. Students shall be entitled to gain credits from courses offered by other recognized institutions directly as well as through distance learning.
- xliii. For the effective operation of the FYUGP, a system of flexible academic transaction timings shall be implemented for the students and teachers.
- xliv. 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

- i. College should appoint a Senior Faculty member as Academic Co-ordinator/Nodal officer for the smooth conduct of FYUGP.
- ii. 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.
- iii. The documents regarding all academic activities of students in a class shall be kept under the custody of the FA/SFA.
- iv. All requests / applications from a student or parent to higher offices are to be forwarded / recommended by FA / SFA.

- v. Students shall first approach their FA/ SFA for all kinds of advice, clarifications, and permissions on academic matters.
- vi. 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.
- vii. 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.
- viii. 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.
- ix. 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).
- x. 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.
  - iv. 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.
- xi. 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.
- xii. 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.
- xiii. 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.
- xiv. 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.

- xv. 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**

- i. 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.
- ii. 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.
- iii. Based on consultations and advice from the faculty adviser, each student shall complete course registration within one week from the commencement of each semester.
- iv. 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.
- v. 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.
- vi. 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.
- vii. The higher education institutions shall admit candidates not only for programmes, but also for courses.

## **8. Re-admission and Scheme Migration**

- i. 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.
- ii. Students who have successfully completed a particular programme pathway maybe permitted to take an additional minor or second major.
- iii. 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**

- i. 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.
- ii. 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.

- iii. 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.
- iv. 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-

- i. An academic year shall consist of 200 working days; one semester consists of 90 working days; and an academic year consists of two semesters.
- ii. 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.
- iii. 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.
- iv. 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.
- v. 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.
- vi. 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).
- vii. A course can have a combination of Lecture (L)/ Tutorial (T)/ Practicum or Practical (P)/ & Others (O) credits.
- viii. Minimum credit for one Course should be 2 (Two), and the maximum credit should be 4 (Four).
- ix. All Discipline Specific Major/Minor Courses shall be of 4 (Four) credits.
- x. For all Discipline Specific Major/Minor Courses, there may be practical/ practicum.
- xi. 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.
- xii. Summer Internship, Apprenticeship, Community Outreach activities, etc. may require sixty hours (or as appropriate) of engagement for acquiring one credit.

- xiii. 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.
- xiv. 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.
- xv. 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.
- xvi. 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.

- i. 20% syllabus of each course will be prepared by the teacher as 'Teacher Specific Content' and will be evaluated under CCA.
- ii. In case of MDC, SEC, VAC courses coming under 3<sup>rd</sup> & 4<sup>th</sup> semester, college should make necessary arrangements to give adequate preference to courses designed by language departments. MDC in the 3<sup>rd</sup> 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

- i. 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.
- ii. 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.
- iii. 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.
- iv. 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.
- v. The faculty concerned may design the particular course and it should be forwarded to the BoS after the approval of department council.
- vi. 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.

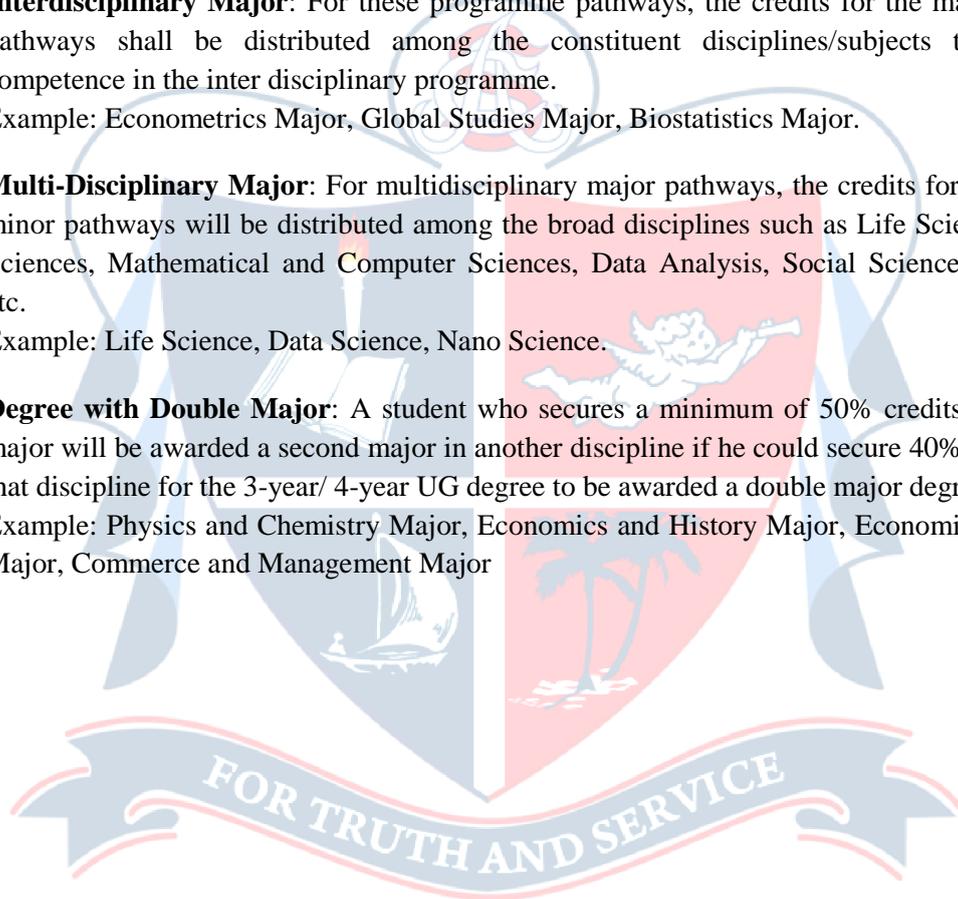
Example: Econometrics Major, Global Studies Major, Biostatistics Major.

- 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											
	Semester 1	Semester 2	Semester 3	Semester 4	Internship of 2 Credits	Semester 5#	Semester 6#	Total	Remarks	Semester 7	Semester 8	Total
<b>DSCA</b> (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
<b>DSCB&amp;C</b> (4 Credit/ Course)	2(P)	2(P)	1(P) (BorC)	1(P) (CorB)				6		3		9
<b>Multidisciplinary Courses (MDC)</b> (3 Credit/ Course)	1(P)	1(P)	1*					3	*Cannot opt from DSC			3
<b>Ability Enhancement Courses (AEC)</b> (3 Credit/ Course)	1 (English) 1 (OL)	1 (English) 1 (OL)						4				4
<b>Skill Enhancement Courses (SEC)</b> (3 Credit/ Course)				1*		1**	1**	3	*Cannot opt from DSCA **From DSCA only			3
<b>Value Addition Courses (VAC)</b> (3 Credit/ Course)			1*	1*			1**	3	*Cannot opt from DSCA **From DSCA only			3
<b>Project/ Dissertation</b> 12 credits for Honours with Research & 8 for Honours											12 (1 DSC /DSE for Honours)	
<b>Total Courses</b>	6	6	6	6		6	6	36		6	2+1	
<b>Total Credits</b>	21	21	22	22	2	23	22		Total Credits 133	24	20	Total Credits 177
<b>Total Hours per Week</b>	25	25	25	25		25	25		Exit option available	25	25	

## Pathway Option 2 – Major with Minor

Course Components	No. of Courses											
	Semester 1	Semester 2	Semester 3	Semester 4	Internship of 2 Credits	Semester 5#	Semester 6#	Total	Remarks	Semester 7	Semester 8	Total
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
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)	
<b>Total Courses</b>	<b>6</b>	<b>6</b>	<b>6</b>	<b>6</b>		<b>6</b>	<b>6</b>	<b>36</b>		<b>6</b>	<b>2+1</b>	
<b>Total Credits</b>	<b>21</b>	<b>21</b>	<b>22</b>	<b>22</b>	<b>2</b>	<b>23</b>	<b>22</b>		<b>Total Credits 133</b>	<b>24</b>	<b>20</b>	<b>Total Credits 177</b>
<b>Total Hours per Week</b>	<b>25</b>	<b>25</b>	<b>25</b>	<b>25</b>		<b>25</b>	<b>25</b>		<b>Exit option available</b>	<b>25</b>	<b>25</b>	

**Pathway Option 3 – Double Major**

Course Components	No. of Courses											Total	
	Semester 1	Semester 2	Semester 3	Semester 4	Internship of 2 Credits	Semester 5#	Semester 6#	Total	Remarks	Semester 7	Semester 8		
<b>DSC A</b> (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
<b>DSC B</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
<b>Multidisciplinary Courses (MDC)</b> (3 Credit/ Course)	1(P)	1(P)	1*						3	*Cannot opt from DSC			3
<b>Ability Enhancement Courses (AEC)</b> (3 Credit/ Course)	1 (English) 1 (OL)	1 (English) 1 (OL)							4				4
<b>Skill Enhancement Courses (SEC)</b> (3 Credit/ Course)				1			1	1	3				3
<b>Value addition Courses (VAC)</b> (3 Credit/ Course)			1	1				1	3				3
<b>Project/Dissertation</b> 12 credits for Honours with Research & 8 for Honours												12 (1 DSC/DSE for Honours)	
<b>Total Courses</b>	6	6	6	6			6	6	36		6	2+1	
<b>Total Credits</b>	21	21	22	22		2	23	22		Total Credits 133	24	20	Total Credits 177
<b>Total Hours per Week</b>	25	25	25	25		25	25		Exit option available	25	25		

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

- i. 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.
- ii. 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.
- iii. 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.
- iv. 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.
- v. 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<sup>rd</sup> & 4<sup>th</sup> 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

Project type	Maximum Marks	CCA	ESE
Research Project of Honours with Research (12 credits)	200	60	140
Project of Honours (8 credits)	100	30	70

## 23. Evaluation of Internship

The evaluation of internship shall be done by a committee constituted by the Department Council. The scheme of CCA and ESE 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

## 24. 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

## 25. 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  $i^{\text{th}}$  semester,  $C_i$  is the number of credits of the  $i^{\text{th}}$  course and  $G_i$  is the grade point scored by the student in the  $i^{\text{th}}$  course.

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

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.

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

Where  $S_i$  is the SGPA in the  $i^{\text{th}}$  semester,  $C_i$  is the total number of credits in the  $i^{\text{th}}$  semester.

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

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

## 26. 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 SACA-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 SACA-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.

### **27. 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

Notwithstanding 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**

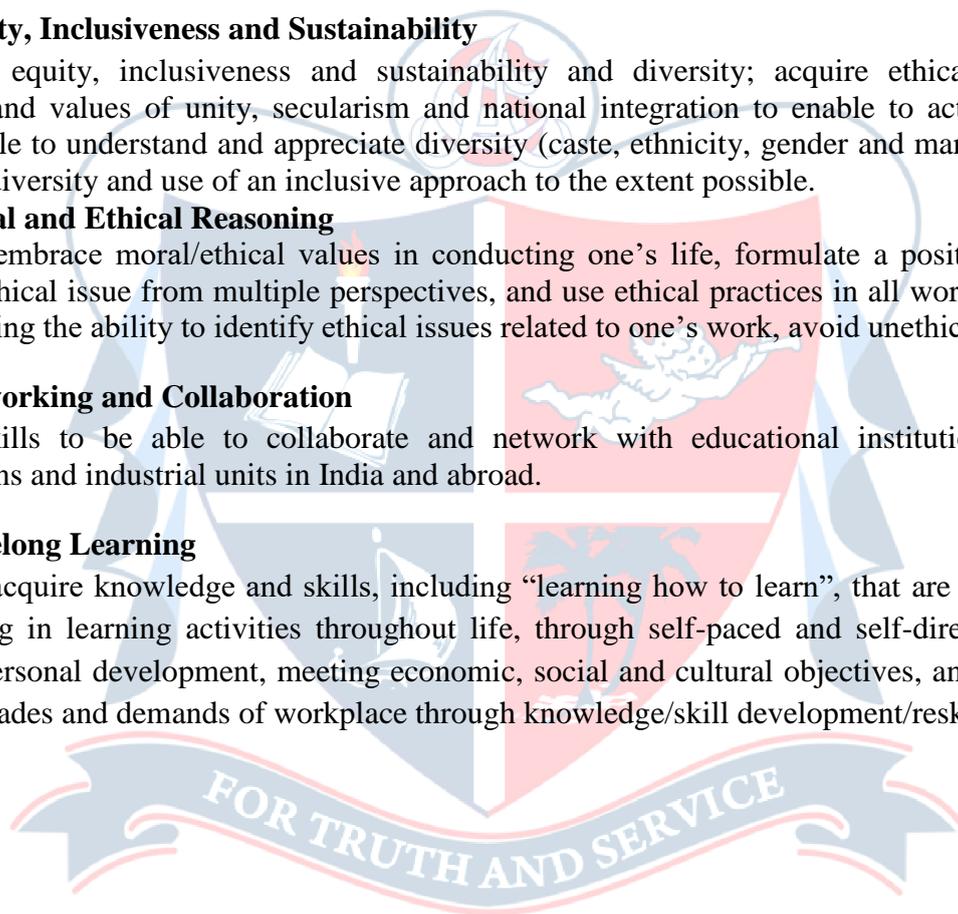
Ability to embrace moral/ethical values in conducting one's life, formulate a position/argument about an ethical issue from multiple perspectives, and use ethical practices in all work. Capable of demonstrating the ability to identify ethical issues related to one's work, avoid unethical behaviour.

**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 major Subject: **Biochemistry**

#### Semester 1

Course Code	Title of the Course	Type of the Course DSC, MDC, SEC, VAC etc.	Credit	Hours/week	Hour Distribution			
					L	T	P	O
24SACBCH1DC101	Biochemistry- The Science of Life	DSC	4	5	3	-		
24SACBCH1MD101	Sports Biochemistry: The Science of Exercise and Human Performance	MDC	3	4	2	-	2	

L- Lecture, T- Tutorial, P- Practicals , O - Others

#### Semester 2

Course Code	Title of the Course	Type of the Course DSC, MDC, SEC, VAC etc	Credit	Hours/week	Hour Distribution			
					L	T	P	O
24SACBCH2DC101	Essentials of Biochemistry: Vitamins, Hormones, Enzymes and Neurotransmitters	DSC	4	5	3		2	
24SACBCH2MD101	Biochemistry in Entrepreneurs hip	MDC	3	4	2	-	2	

L- Lecture, T- Tutorial, P- Practicals , O - Others

**Semester 3**

Course Code	Title of the Course	Type of the Course DSC, MDC, SEC, VAC etc	Credit	Hours/week	Hour Distribution			
					L	T	P	O
24SACBCH3DC101	Techniques in Biochemistry and Forensic Science	DSC	4	5	3		2	
24SACBCH3MD101	Food as Medicine	MDC	3	4	4	-	0	
24SACBCH3VA101	Microplastics and Environment	VAC	3	4	4	-	0	

L- Lecture, T- Tutorial, P- Practicals, O - Others

**Semester 4**

Course Code	Title of the Course	Type of the Course DSC, MDC, SEC, VAC etc	Credit	Hours/week	Hour Distribution			
					L	T	P	O
24SACBC4DC101	Metabolism of Carbohydrates, Proteins and Lipids	DSC	4	5	3		2	
24SACBCH4SEC101	Biochemical Tests in Disease Diagnosis	SEC	3	4	4	-	0	
24SACBCH4VA101	Narcotics and Psychotropic Substances	VAC	3	4	4	-	0	

L- Lecture, T- Tutorial, P- Practicals , O - Others

**Semester 6**

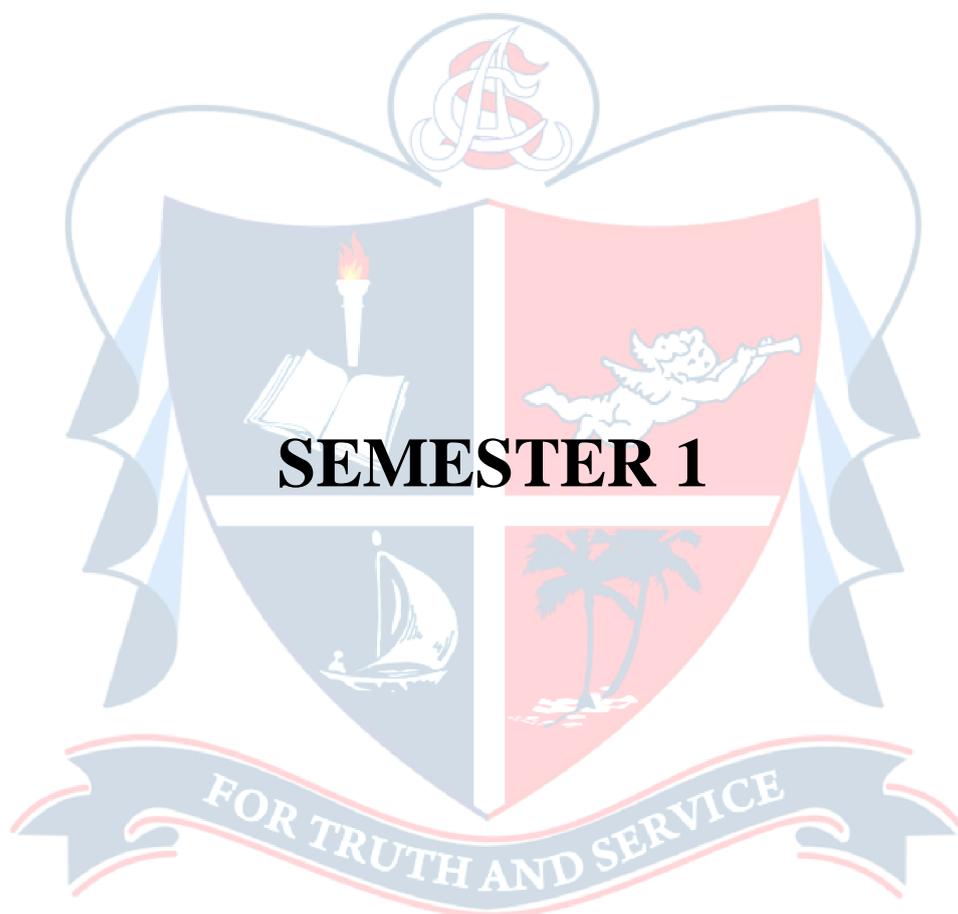
Course Code	Title of the Course	Type of the Course DSC, MDC, SEC, VAC etc	Credit	Hours/week	Hour Distribution			
					L	T	P	O
24SACBCH6SEC101	Forensic Impression analysis	SEC	3	4	2	-	2	
24SACBCH6VA101	Environmental Biochemistry and Human Rights	VAC	3	4	4	-	0	

L- Lecture, T- Tutorial, P- Practicals , O - Others

**Semester 7**

Course Code	Title of the Course	Type of the Course DSC, MDC, SEC, VAC etc	Credit	Hours/week	Hour Distribution			
					L	T	P	O
24SACBCH7DE101	IPR and Bioethics	ELECTIVE	3	4	4	-	0	

L- Lecture, T- Tutorial, P- Practicals , O - Others





## Department of Biochemistry St. Albert's College (Autonomous) Ernakulam

<b>Programme</b>	<b>Biochemistry Minor</b>					
<b>Course Name</b>	<b>Biochemistry-The Science of Life</b>					
<b>Type of Course</b>	<b>DSC B</b>					
<b>Course Code</b>	<b>24SACBCH1DC101</b>					
<b>Course Level</b>	<b>100-199</b>					
<b>Course Summary</b>	The primary objective of this course is to establish a strong foundation in biochemistry for students, with a focus on essential molecular components. Additionally, the course covers fundamental procedures within a biochemistry laboratory and the qualitative analysis of biomolecules.					
<b>Semester</b>	I	Credits			4	Total Hours
<b>Course Details</b>	Learning Approach	Lecture	Tutorial	Practical	Others	
		3	0	1	0	75
<b>Pre-requisites, if any</b>	Nil					

### COURSE OUTCOMES (CO)

CO No.	Expected Course Outcome	Learning Domains *	PO No
1.	Acquire an understanding of the nature of cells, water, buffers and the scope of Biochemistry	K, U, I	2, 3, 4, 6, 10
2.	Demonstrate the structure and functions of carbohydrates	K, U, E	1, 2, 3, 4
3.	Describe the general structure of amino acids and structural organisation of proteins	K, U, E	1, 2, 3, 4
4.	Evaluate the chemical nature of lipids and nucleic acids.	U, E, An	1, 2, 3, 4
5.	Demonstrate laboratory safety practices and preparation of solutions.	An, E, Ap	2, 5, 8, 10
6.	Employ appropriate biochemical tests to identify unknown biomolecules	U, A, C, S	2, 8, 10

**\*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)

<b>Module</b>	<b>Units</b>	<b>Course description</b>	<b>Hrs</b>	<b>CO No.</b>
<b>1. Introduction to Biochemistry</b>	1.1	History of Biochemistry.	2	1
	1.2	Cells - the basis of living organisms- prokaryotic and eukaryotic cells.	2	1
	1.3	Importance of water in biological systems - interactions in aqueous systems.	3	1
	1.4	Dissociation of water, ionic product of water, concepts of pH and pOH, acids and bases, pHscale, Buffers.	3	1
	1.5	Buffers, biological buffers- bicarbonate buffer, phosphate buffer, hemoglobin buffer.	2	1
	1.6	Different types of biomolecules and their functional groups.	2	1
	1.7	Scope of Biochemistry.	1	1
<b>2. Carbohydrates and Proteins</b>	2.1	Classification of carbohydrates	1	2
	2.2	Monosaccharides and their importance (glucose, galactose, mannose and fructose with structures), Isomerism of carbohydrates - D and L forms, epimers, anomers. Disaccharides - sucrose, maltose, lactose	3	2
	2.3	Haworth perspective formula and functions of disaccharides - sucrose, maltose, lactose.	2	2
	2.4	Structure and important properties of the homopolysaccharides - starch, cellulose and glycogen. (without structure) heteropolysaccharide - hyaluronate (without structure)	3	2
	2.5	Name (with one letter and three letter code) of the 20 standard amino acids, general structure of amino acid. Zwitterions.	3	3
	2.6	Elementary study of primary, secondary, tertiary and quaternary structural levels in proteins.	3	3
<b>3. Lipids and</b>	3.1	Classification and functions of lipids, Fatty acids - structures of stearic acid, oleic acid and linoleic acid.	2	4

<b>Nucleic Acids</b>	3.2	Structure and significance of triacylglycerol phosphatidic acid, lecithin and cholesterol.	3	4
	3.3	Chemical nature of nucleic acids- purines and pyrimidines, deoxyribose, ribose, nucleosides, nucleotides. Phosphodiester linkage.	4	4
	3.4	Watson-Crick model of DNA, Chargaff rule, Different forms of DNA-A, B and Z DNA. Introduction to types of RNA (mRNA, rRNA and tRNA). Central Dogma	6	4
<b>4. Practical</b>	4.1	Laboratory Safety Practices, Preparation of normal, molar, percentage solution and dilution of stock solutions. Determination of pH using a pH meter.	6	5
	4.2	Systematic analysis of carbohydrates and amino acids in the given unknown samples.	10	6
	4.3	Qualitative analysis of lipids and nucleic acids	9	6
	4.4	Industry/ Laboratory visit	5	6
<b>5. Teacher specific content</b>	5.1		-	

<b>Teaching and Learning Approach</b>	<p><b>Classroom Procedure (Mode of transaction)</b></p> <p>The course content will be transacted through Lectures, E-learning, Seminars, presentations, Group activity, Interactive sessions and Laboratory sessions</p>
<b>Assessment Types</b>	<p><b>MODE OF ASSESSMENT</b></p> <p><b>A. Continuous Comprehensive Assessment (CCA)</b></p> <p>Theory 25 marks</p> <ol style="list-style-type: none"> <li>Poster making/model building</li> <li>Seminar presentation/Quiz</li> <li>Involvement in group discussion</li> <li>Multiple Choice questions</li> <li>Assignment</li> </ol> <p>Open book test</p> <p>Practical 5 marks*</p> <ol style="list-style-type: none"> <li>Viva (1 marks)</li> <li>Record (1 marks)</li> <li>Laboratory involvement &amp; Exam (3 marks)</li> </ol> <p>*This mark to be converted to 7.5 marks</p>

	<p><b>B. End Semester Examination (ESE)</b>  Written examination for one and a half hours (50 marks)</p> <p>MCQ (20 OUT OF 20) 20x1=20 Marks.  Short Answer Questions (4 out of 6) 4x5=20 Marks.  Essay ( 1 out of 2)1x10=10 Marks</p> <p>Practical examination (20 marks)*  *This mark to be converted to 17.5 marks</p> <ol style="list-style-type: none"> <li>1.Viva (15 marks)</li> <li>2.Record (3 marks)</li> <li>3.Laboratory involvement &amp; Exam (2 marks)</li> </ol>
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### References

1. Nelson D. L., Cox M. M. (2021) Lehninger Principles of Biochemistry, (8<sup>th</sup> ed.) W.H. Freeman&. Co Ltd.
2. Berg J.M., Gatto G.J., Hines J, Tymoczko J.L., Stryer L. (2023) Biochemistry (10<sup>th</sup>ed.) W.H. Freeman &. Co Ltd.
3. West E.S., Todd W.R., Mason H.S., Van Bruggen J.T., (2017) Text Book of Biochemistry(4<sup>th</sup> ed.)
4. Voet D., Voet J., Pratt C.W., (2018) Voet's Principles of Biochemistry (5<sup>th</sup> ed.)
5. Rastogi V. B., Aneja K.R.,(2020) Zubay's Principles of Biochemistry (5<sup>th</sup> ed.)

### Suggested Readings

1. Das D., (2015) Biochemistry (14<sup>th</sup> ed.) Academic publishers



## Department of Biochemistry St. Albert's College (Autonomous) Ernakulam

<b>Programme</b>	<b>Biochemistry MDC</b>					
<b>Course Name</b>	<b>Sports Biochemistry: The Science of Exercise and Human Performance</b>					
<b>Type of Course</b>	<b>MDC</b>					
<b>Course Code</b>	<b>24SACBCH1MD101</b>					
<b>Course Level</b>	<b>100-199</b>					
<b>Course Summary</b>	The course on sports biochemistry delves into the complex interplay among sports, exercise, and biochemistry. The students will acquire an understanding of the biochemical mechanisms during physical activity, the impact of exercise on the body's systems, and the ways in which biochemistry shapes both athletic performance and overall well-being.					
<b>Semester</b>	1	Credits			3	Total Hours
<b>Course Details</b>	Learning Approach	Lecture	Tutorial	Practical	Others	
		2	0	1	0	60
<b>Pre-requisites, if any</b>	Nil					

### COURSE OUTCOMES (CO)

CO No.	Expected Course Outcome	Learning Domains*	PO No
1	Attain a thorough comprehension of the biochemical processes that form the foundation of exercise and sports performance.	K, U, A	1,2,3,4,6
2	Demonstrate the ability to apply biochemistry principles to design personalized training and nutrition plans.	U, A, C,S	1,2,3,4,8
3	Conduct a critical analysis of how hormones, metabolism, and nutrition significantly influence athletic performance.	U, An, E	2,3,4,
4	Develop an understanding of the ethical considerations surrounding sports nutrition and supplementation.	K, U, Ap	1,2,3,4, 6,8
5	Acquire an understanding of fundamental concepts related to sports injuries, recovery, and cellular adaptations.	U, E, A	1,2,3,4

6	Develop practical skills in assessing and optimizing biochemical factors influencing sports and exercise.	A, S, I	1,2,3,4,7,9,10
<i>*Remember (K), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C), Skill(S), Interest (I) and Appreciation (Ap)</i>			

**COURSE CONTENT****Content for Classroom transaction (Units)**

Module	Units	Course description	Hrs	CO No.
<b>1. Fundamentals of Sports Biochemistry</b>	1.1	Introduction Definition and scope of sports biochemistry. Importance in the field of sports science and medicine.	2	1
	1.2	Fuel utilization and Importance of hormones in Sports Fuel utilization in different sports. Role of hormones in Exercise: Adrenaline and noradrenaline, Insulin and glucagon, Cortisol, Growth hormones	4	3
	1.3	Muscle Biochemistry & Adaptations Overview of muscle tissue types (skeletal, smooth, cardiac) with focus on skeletal muscle in the context of sports biochemistry. Role of muscle in energy production during exercise. Overview of Cellular adaptations, Metabolic adaptation, Enzyme and Hormonal Adaptations, Strength and Power Adaptations, Neural adaptations, Endurance Adaptations.	3	3
	1.4	Sports Nutrition Macronutrients and Micronutrients. Hydration: Significance of maintaining proper fluid balance during exercise. Pre-Exercise Nutrition: Timing and composition of pre-exercise meals for optimizing performance. During-Exercise Nutrition: Importance of maintaining energy and hydration during prolonged exercise. Use of sports drinks, gels, and other supplements during activities. Post-Exercise Nutrition: Nutrient timing and composition for post-exercise recovery. Protein intake to support muscle repair and glycogen replenishment.	3	2

	1.5	<p>Ergogenic Aids Definition and Types Legal and Illegal Substances</p> <p>Caffeine: Effects of caffeine on performance and endurance. Recommended dosage and timing for optimal benefits. Creatine: Role of creatine in enhancing strength, power, and muscle recovery. Safe and effective usage guidelines. Nitric Oxide Precursors: Substances that enhance nitric oxide production for improved blood flow and oxygen delivery. Beta-Alanine: Buffering capacity and its role in reducing muscle fatigue.</p>	3	4
<b>2. Diseases, Recovery, Practical Applications</b>	2.1	<p>Sports Injuries</p> <p>Types of Sports Injuries: sprains, strains, fractures, and overuse injuries</p> <p>Biochemical Markers of Injury: Identifying and monitoring Specific biochemical markers (e.g., creatine kinase, cytokines) associated with tissue damage. Using biomarkers to assess the severity and progression of injuries.</p>	3	5
	2.2	<p>Recovery strategies</p> <p>Repair and Regeneration: Overview of the biochemical mechanisms involved in tissue repair and regeneration</p> <p>Recovery strategies</p> <p>Rest and Periodization: Understanding the importance of rest and recovery in preventing overtraining and reducing the risk of injuries. Incorporating periodization in training programmes to allow for adequate recovery.</p> <p>Nutrition for Recovery: Adequate protein intake for muscle repair, carbohydrate replenishment for glycogen stores, and hydration.</p> <p>Cryotherapy and Thermotherapy: Using cold and heat applications to manage inflammation and promote recovery. Understanding the biochemical effects of cryotherapy and thermotherapy</p> <p>Sleep and Circadian Rhythms: Importance of quality sleep in promoting recovery and optimizing performance.</p> <p>Psychological Strategies: Incorporating psychological techniques (e.g., mindfulness, visualization) for stress reduction and mental recovery.</p>	7	5

	2.3	<p>Practical applications and safety in sports:</p> <p>Individualized Training Programs: Designing training programs tailored to an athlete's specific needs, goals, and physical condition.</p> <p>Biomechanical Analysis: Conducting biomechanical assessments to identify and correct movement patterns that may contribute to injuries.</p> <p>Nutrition and Hydration Strategies: Developing personalized nutrition plans to meet the energy demands of training and competition. Emphasizing hydration protocols to prevent dehydration and maintain optimal performance. Monitoring and Recovery Protocols: Implementing monitoring tools (e.g., heart rate variability, sleep tracking) to assess an athlete's physiological responses to training.</p>	5	4
<b>3. Practical</b>	3.1	Measurement of Lung Capacity	3	6
	3.2	Heart Rate Variability (HRV) Assessment	3	6
	3.3	Respiratory Quotient (RQ) Calculation	3	6
	3.4	Hydration Status Assessment	3	6
	3.5	First Aid And Preventive Measures	3	6
	3.6	Field/Industrial Visit	15	6
<b>4. Teacher specific content</b>	4.1			

<b>Teaching and Learning Approach</b>	<p><b>Classroom Procedure (Mode of transaction)</b></p> <p>Direct Instruction: Brainstorming lecture, E-learning</p> <p>Interactive Session: Seminar, Group Assignments, Library work and Group discussion, Presentation by individual student</p> <p>Practical: Hands on learning, real world application, problem solving</p>
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<b>Assessment Types</b>	<p><b>MODE OF ASSESSMENT</b></p> <p><b>A. Continuous Comprehensive Assessment (CCA)</b></p> <p>Theory 15 marks</p> <ol style="list-style-type: none"> <li>1. Poster making/model building</li> <li>2. Seminar presentation/Quiz</li> <li>3. Involvement in group discussion</li> <li>4. Assignment</li> <li>5. Open book test</li> </ol> <p>Practical 10 marks*</p> <ol style="list-style-type: none"> <li>1. Viva (2 marks)</li> <li>2. Record (3 marks)</li> <li>3. Laboratory involvement &amp; Exam (5 marks)</li> </ol> <p>*This mark to be converted to 7.5 marks</p>
	<p><b>B. End Semester Examination</b></p> <p>Written examination for one hour (35 marks)</p> <p>MCQ (15 OUT OF 15) 15x1=15 Marks.</p> <p>Short Answer Questions (4 out of 6) 4x5=20 Marks.</p> <p>Practical examination (15 marks)*</p> <ol style="list-style-type: none"> <li>1. Viva (2 marks)</li> <li>2. Record (3 marks)</li> <li>3. Laboratory involvement &amp; Exam (10 marks)</li> </ol> <p>*This mark to be converted to 17.5 marks</p>

### References

1. Anshel, M. H., et al. (1991). Dictionary of the Sport and Exercise Sciences, Human Kinetics, USA
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8. Schmidt, R., & Wrisberg, C. (2000). Motor Learning and Performance: A Problem-Based Learning Approach (2nd ed.). Human Kinetics, USA
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### Suggested Readings

1. Bubbs, M. (2019). Peak: The New Science of Athletic Performance That is Revolutionizing Sports. Chelsea Green publishing Company







## Department of Biochemistry St. Albert's College (Autonomous) Ernakulam

<b>Programme</b>	<b>Biochemistry Minor</b>					
<b>Course Name</b>	<b>Essentials of Biochemistry: Vitamins, Hormones, Enzymes and Neurotransmitters</b>					
<b>Type of Course</b>	<b>DSC B</b>					
<b>Course Code</b>	<b>24SACBCH2DC101</b>					
<b>Course Level</b>	<b>100-199</b>					
<b>Course Summary</b>	This comprehensive course delves into the fundamental biochemical aspects of vitamins, hormones, enzymes, and neurotransmitters, exploring their roles in maintaining physiological balance and supporting essential cellular functions.					
<b>Semester</b>	2	Credits			4	Total Hours
<b>Course Details</b>	Learning Approach	Lecture	Tutorial	Practical	Others	
		3	0	1	0	75
<b>Pre-requisites, if any</b>	Nil					

### COURSE OUTCOMES (CO)

CO No.	Expected Course Outcome	Learning Domains*	PO No
1	Discuss the fundamentals of vitamins	K,U	1,2,3,4
2	Describe the general features of hormones and their receptors.	U, E	2,3,4
3	Describe the classification, functions, mechanism of action and deficiency disorders of hormones	U, E, A	1,2,3,4
4	Evaluate neurotransmitter and its mechanism of action	A, E	1,2,3,4
5	Analyse the mechanism of enzyme catalysis, kinetics and specificity	U, An, E	1,2,3,4
6	Demonstrate proficiency in enzyme and vitamin extraction and quantification from various sources	U, A, S, Ap	1,2,3,4,10
7	Demonstrate the mechanism of action of hormones / neurotransmitters through presentations	A,S,C, I	2,3,4,6,10

**\*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.
<b>1. Vitamins</b>	1.1	Vitamins- General introduction	3	1
	1.2	Classification and nomenclature of vitamins	4	1
	1.3	Fat soluble vitamins (types, biochemical and physiological functions, deficiency diseases) Vitamins as Coenzymes	3	1
	1.4	Water soluble vitamins (types, biochemical and physiological functions, deficiency diseases)	5	1
	2.1	History of endocrinology	1	2
	2.2	Concept on target gland, negative and positive feedback, characteristics and transport of hormones	3	2
	2.3	Hormone receptors and its classification	3	2
<b>2. Hormones &amp; Neurotransmitters</b>	2.4	Outline study of hypothalamic, pituitary, thyroid, parathyroid, adrenal, pancreatic and gastro intestinal hormones (types of hormones, physiological and biochemical role, deficiency diseases)	3	3
	2.5	Mechanism of action of peptide and steroid hormones	3	3
	2.6	Neurotransmitters-definition, classification, types of receptors, role in synaptic transmission	3	4
	2.7	Molecular mechanisms of action - Acetylcholine, biogenic amines, catecholamines, serotonin, amino acids. Neuroactive peptides as transmitters.	4	4
<b>3. Enzymes</b>	3.1	Classification of enzymes- six major classes of enzymes with one example each.	2	5
	3.2	Cofactors and coenzymes	1	5
	3.3	Elementary study of the factors affecting velocity of enzyme catalysed reactions- effect of substrate concentration, enzyme concentration, temperature and pH	2	5
	3.4	Michaelis-Menten equation (without derivation). $K_m$ and its significance, Lineweaver Burk plot.	2	5
	3.5	Enzyme specificity- an example each for group specificity, optical specificity, geometrical specificity and cofactor specificity of enzymes.	3	5

<b>4. Practical</b>	4.1	Extraction and assay of enzymes - Acid phosphatase from Fresh Potato ( <i>Solanum tuberosum</i> )	5	6
	4.2	Extraction and assay of enzymes - $\beta$ - amylase from sweet potato ( <i>Ipomoea batatas</i> )	5	6
	4.3	Extraction and assay of enzymes -Catalase from bovine / porcine liver	5	6
	4.4	Extraction and assay of enzymes -Urease from Jackbean( <i>Canavalia ensiformis</i> )	5	6
	4.5	Estimation of ascorbic acid from lemon guice	5	6
	4.6	Demonstration of the mechanism of action of hormones / neurotransmitters through posters, models, and digital presentations	5	7

<b>Teaching and Learning Approach</b>	<p><b>Classroom Procedure (Mode of transaction)</b></p> <p>The course content will be transacted through seminars, power point presentations, Group activity, Interactive sessions and Laboratory sessions.</p>
<b>Assessment Types</b>	<p><b>MODE OF ASSESSMENT</b></p> <p><b>A. Continuous Comprehensive Assessment (CCA)</b></p> <p>Theory 25marks</p> <ol style="list-style-type: none"> <li>Poster making/model building</li> <li>Seminar presentation/Quiz</li> <li>Involvement in group discussion</li> <li>Multiple Choice questions</li> <li>Assignment</li> </ol> <p>Open book test</p> <p>Practical 5 marks*</p> <ol style="list-style-type: none"> <li>Viva (1 marks)</li> <li>Record (1 marks)</li> <li>Laboratory Exam (3 marks)</li> </ol> <p>*This mark to be converted to 7.5 marks</p>
	<p><b>B. End Semester Examination (ESE)</b></p> <p>Written examination for one and a half hours (50 marks)</p> <p>MCQ (20 OUT OF 20) 20x1=20 Marks.</p> <p>Short Answer Questions (4 out of 6) 4x5=20 Marks.</p>

	Essay ( 1 out of 2)1x10=10 Marks  Practical examination (20 marks)* 1. Viva (2 marks) 2. Record (3 marks) 3. Laboratory involvement & Exam (15 marks)  *This mark to be converted to 17.5 marks
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- Botham K, McGuinness O., Weil P.A., Kennelly P., Rodwell V. (2022) Harper's Illustrated Biochemistry (32<sup>nd</sup> ed.) Mc Graw Hill Education
- Kandel E., Schwartz J, Jessell T., Siegelbaum S., Hudspeth A. (2013) Principles of Neuroscience (5<sup>th</sup> ed.) Mc Graw Hill Education
- Nelson D. L., Cox M. M. (2021) Lehninger Principles of Biochemistry, (8th ed.) W.H. Freeman & Co Ltd.
- Berg J.M., Gatto G.J., Hines J, Tymoczko J.L., Stryer L. (2023) Biochemistry (10<sup>th</sup> ed.) W.H. Freeman & Co Ltd.
- West E.S., Todd W.R., Mason H.S., Van Bruggen J.T., (2017) Text Book of Biochemistry (4th ed.)
- Voet D., Voet J., Pratt C.W., (2018) Voet's Principles of Biochemistry (5th ed.)
- Experimental Biochemistry: A Student Companion, Beedu Sasidhar Rao & Vijay Deshpande (ed), I.K International Pvt. LTD, New Delhi
- Introductory Practical biochemistry, S. K. Sawhney & Randhir Singh (eds) Narosa Publishing House, New Delhi
- Standard Methods of Biochemical Analysis, S. K. Thimmaiah (ed), Kalyani Publishers, Ludhiana

### Suggested Readings

- Banerjee P.K. (2020) Introduction to Biophysics (Revised Edition) AB Book.
- Das D. (2015) Biochemistry (14<sup>th</sup> ed.) Academic publishers



## Department of Biochemistry St. Albert's College (Autonomous) Ernakulam

<b>Programme</b>	<b>Biochemistry MDC</b>					
<b>Course Name</b>	<b>Biochemistry in Entrepreneurship</b>					
<b>Type of course</b>	<b>MDC</b>					
<b>Course code</b>	<b>24SACBCH2MD101</b>					
<b>Course level</b>	<b>100-199</b>					
<b>Course summary</b>	The "Biochemistry in Entrepreneurship" course is designed to equip students with a multifaceted understanding of the intersection between biochemistry and business. The course then transitions to the practical aspects of the nutraceutical industry, covering business strategies, regulatory frameworks, and essential marketing principles.					
<b>Semester</b>	2	Credits			3	Total hours
<b>Course details</b>	Learning approach	Lecture	Tutorial	Practical	Others	
		2	0	1	0	60
<b>Pre-requisites, if any</b>	Nil					

### COURSE CONTENT

#### Content for Classroom transaction (Sub-units)

Module	Unit	Course description	Hrs	CO. No.
<b>1. Foundations of holistic wellness: Exploring nutrition, Nutraceuticals, and herbal health supplements</b>	1.1	Health and Nutrition	2	1
	1.2	Role of Nutraceuticals supplements	3	1
	1.3	Lifestyle disorders	3	1
	1.4	Herbal Supplements	2	1
<b>2. Navigating the Nutraceutical</b>	2.1	Nutraceutical business; Dietary supplements, Functional foods, Phytochemicals, Multivitamins; Nutraceutical product classifications	4	2

<b>landscape: Business, regulations, marketing essential and biochemical entrepreneurship</b>	2.2	Regulations and laws; New Product Development and regulatory activities, Good Manufacturing Practice requirements	3	3
	2.3	Key terminologies of marketing; Nutraceutical labelling –FDA, FSSAI labelling, Label claim	3	4
	2.4	Biochemistry Unleashed: Understanding the Entrepreneurial Potential	3	5
	2.5	Emerging Trends: Current landscape, Future projections, Industry insights	3	5
	2.6	Commercializing Biochemical Dreams: From Lab to Market	2	5
	2.7	Social Impact Entrepreneurship: Merging Biochemistry with Societal Well-being	2	5
<b>3. Practical</b>	3.1	Survey on the demand and requirement of herbal products/formulations	4	6
	3.2	Product promotion techniques	4	6
	3.3	Product branding and strategy	2	6
	3.4	Public awareness campaign on healthcare needs	10	6
	3.5	Industrial/Field Visit	10	6
<b>4. Teacher facilitated activities</b>	4.1			

<b>Teaching and Learning Approach</b>	<p><b>Classroom Procedure (Mode of transaction)</b></p> <p>Direct Instruction: Brainstorming lecture, E-learning            Interactive session: Seminar, Group Assignments, Library work and Group discussion, Presentation by individual student            Practical: Hands-on learning, real-world application, problem solving</p>
<b>Assessment Types</b>	<p><b>MODE OF ASSESSMENT</b></p> <p><b>A. Continuous Comprehensive Assessment (CCA)</b></p> <p>Theory 15 marks</p> <ol style="list-style-type: none"> <li>Poster making/model building</li> <li>Seminar presentation/Quiz</li> <li>Involvement in group discussion</li> <li>Assignment</li> <li>Open book test</li> </ol>

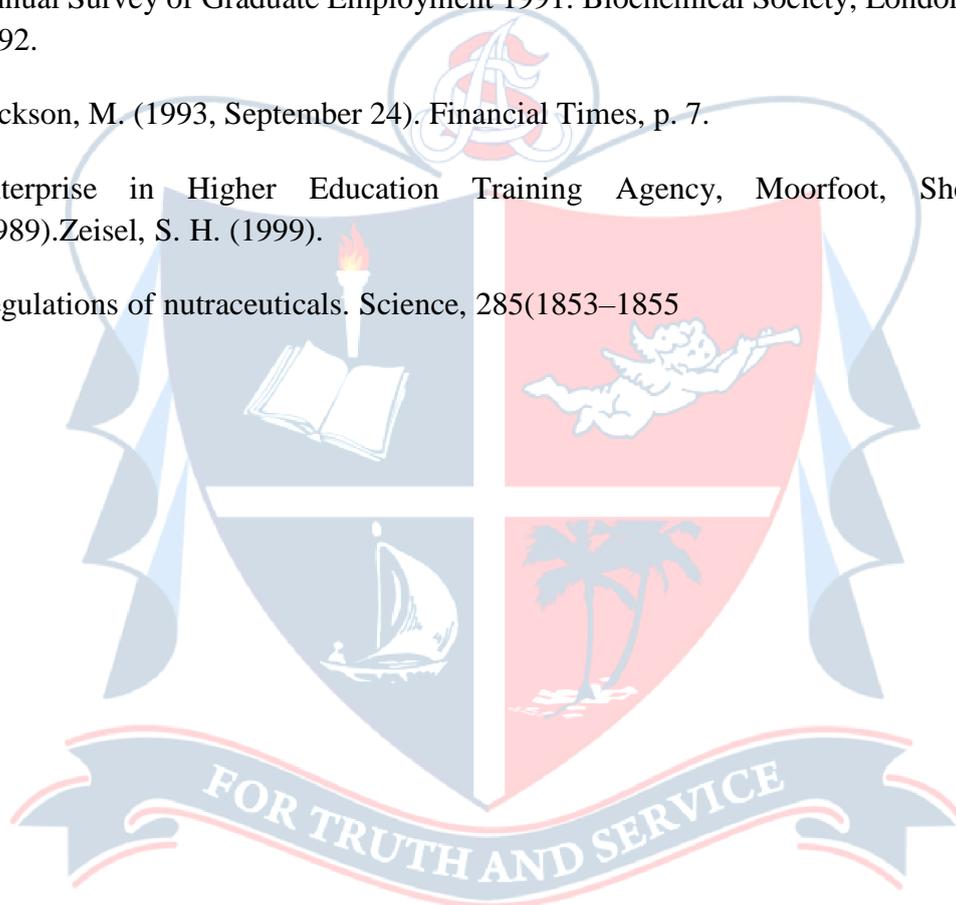
<p>Practical 10 marks*</p> <ol style="list-style-type: none"> <li>Viva (2 marks)</li> <li>Record (3 marks)</li> <li>Laboratory involvement &amp; Exam (5 marks)</li> </ol> <p>*This mark to be converted to 7.5 marks</p>
<p><b>C. End Semester Examination (ESE)</b> Written internal examination for one hour (35 marks)</p> <p>MCQ (15 OUT OF 15) 15x1=15 Marks. Short Answer Questions (4 out of 6) 4x5=20 Marks.</p> <p>Practical examination (15 marks)*</p> <ol style="list-style-type: none"> <li>Viva (2 marks)</li> <li>Record (3 marks)</li> <li>Laboratory involvement &amp; Exam (10 marks)</li> </ol> <p>*This mark to be converted to 17.5 marks</p>

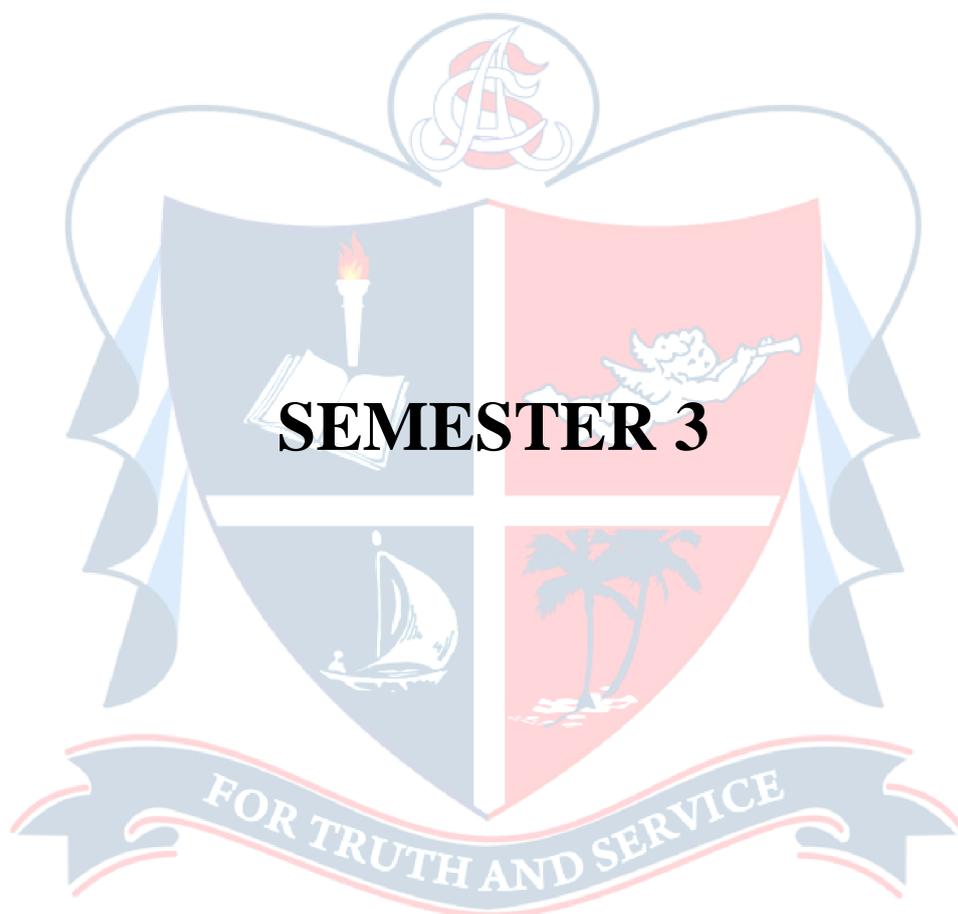
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- DeFelice, S. (2007). *The Foundation for Innovation in Medicine*. <http://www.fimdefelice.org>.
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- Lockwood, B. (2007). *Nutraceuticals*, 2nd Edition. London, UK: Pharmaceutical Press, p. 1.

### Suggested Readings

1. Adebawale, A. O., Liang, Z., & Eddington, N. D. (2000). Nutraceuticals, a call for quality control of delivery systems: a case study with chondroitin sulfate and glucosamine. *J. Nutraceut. Funct. Med. Foods*, 2, 15–30.
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3. Annual Survey of Graduate Employment 1991. Biochemical Society, London, 1992.
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5. Enterprise in Higher Education Training Agency, Moorfoot, Sheffield. (1989). Zeisel, S. H. (1999).
6. Regulations of nutraceuticals. *Science*, 285(1853–1855)







## Department of Biochemistry St. Albert's College (Autonomous) Ernakulam

<b>Programme</b>	<b>Biochemistry Minor</b>					
<b>Course Name</b>	<b>Techniques in Biochemistry and Forensic Science</b>					
<b>Type of Course</b>	<b>DSC B</b>					
<b>Course Code</b>	<b>24SACBCH3DC101</b>					
<b>Course Level</b>	<b>200-299</b>					
<b>Course Summary</b>	This course provides a comprehensive understanding of advanced techniques widely used in biochemistry, molecular biology and forensic science with a focus on practical applications in research and diagnostics. Students will gain both theoretical knowledge and hands-on experience, preparing them for careers in various scientific fields.					
<b>Semester</b>	3	Credits			4	Total Hours
<b>Course Details</b>	Learning Approach	Lecture	Tutorial	Practical	Others	75
		3	0	1		
<b>Pre-requisites, if any</b>	Nil					

### COURSE OUTCOMES (CO)

CO No.	Expected Course Outcome	Learning Domains *	PO No
1	Develop a comprehensive understanding of various biochemical and forensic techniques used in analysing biological samples.	K, U, An	1,2,3,4
2	Evaluate diverse aspects of chromatographic techniques	U, E, A	1,2,3,9, 10
3	Explore electrophoresis and blotting methods	E, An, A	1,2,3,9
4	Explain the fundamental principles of spectroscopy, colorimetry, centrifugation and microscopy	U, An, S	1,2,3,4
5	Demonstrate the crime scene sample collection and Processing	U, E, C	1,2,3,9
6	Describe the role of DNA fingerprinting role in clinical settings, such as paternity/maternity testing	U, E, A	1,2,4,6, 8
7	Apply techniques in biochemistry, molecular biology, forensic science, and biotechnology	U, S, Ap	1,2,3,9, 10

**\*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.
<b>1. Separation Techniques</b>	1.1	Introduction to Biochemical Techniques	1	1
	1.2	Chromatography- Terminology, classification based on principle and type of chromatographic bed used, and the physical state of mobile phase.	3	2
	1.3	Planar chromatography-Principle, procedure & applications of paper chromatography and TLC.	3	2
	1.4	Column chromatography- Principle, procedure & applications of Affinity Chromatography, Gel Exclusion Chromatography	3	2
	1.5	Electrophoretic techniques-Introduction, principle, procedure and applications of AGE and PAGE	3	3
	1.6	Blotting techniques- Southern, Northern and Western	2	3
<b>2. Spectroscopy, Colorimetry, Centrifugation and Microscopy</b>	2.1	Spectroscopy- Types of spectroscopy (an outline study)	2	4
	2.2	Colorimetry-Beer Lambert's law	2	4
	2.3	Instrumentation and applications of colorimeter and UV-Visible Spectrophotometer.	4	4
	2.4	Centrifugation-Principle and types	6	4
	2.5	Introduction to Microscopy (Overview)	1	4
<b>3. Crime site sample collection and Processing</b>	3.1	Source of DNA in Forensic cases, PCR	5	5
	3.2	ELISA, RIA	5	5
	3.3	DNA Finger Printing- Paternity and maternity Testing	5	6
<b>4. Practical</b>	4.1	Beer Lambert's law verification	4	7
	4.2	Paper Chromatography/Thin layer Chromatography	8	7
	4.3	Electrophoresis (Demonstration)	8	7
	4.4	DNA Isolation (from onion/Green peas)	5	7
	4.5	Estimation of isolated DNA	5	7
<b>5. Teacher specific content/ Teacher facilitated activities</b>				

<b>Teaching and Learning Approach</b>	<b>Classroom Procedure (Mode of transaction)</b>  Direct Instruction: Lecture, tutorials, e- resources, animated videos, virtuellab Indirect session: Group discussion, seminar presentation Practical: Hands on learning, real world application, problem solving
<b>AssessmentTypes</b>	<b>MODE OF ASSESSMENT</b> <b>A. Continuous Comprehensive Assessment (CCA)</b> Theory 25 marks <ol style="list-style-type: none"> <li>1. Poster making/model building</li> <li>2. Seminar presentation/Quiz</li> <li>3. Involvement in group discussion</li> <li>4. Multiple Choice questions</li> <li>5. Assignment</li> <li>6. Open book test</li> </ol> Practical 5 marks* <ol style="list-style-type: none"> <li>1. Viva (1 marks)</li> <li>2. Record (1 marks)</li> <li>3. Laboratory involvement &amp; Exam (3 marks)</li> </ol> *This mark to be converted to 7.5 marks <hr/> <b>B. End Semester Examination</b> Written examination for one and a half hours (50 marks)  MCQ (20 OUT OF 20) 20x1=20 Marks. Short Answer Questions (4 out of 6) 4x5=20 Marks. Essay ( 1 out of 2)1x10=10 Marks  Practical examination (20 marks)* *This mark to be converted to 17.5 marks <ol style="list-style-type: none"> <li>1.Viva (15 marks)</li> <li>2.Record (3 marks)</li> <li>3.Laboratory involvement &amp; Exam (2 marks)</li> </ol> *This mark to be converted to 17.5 marks

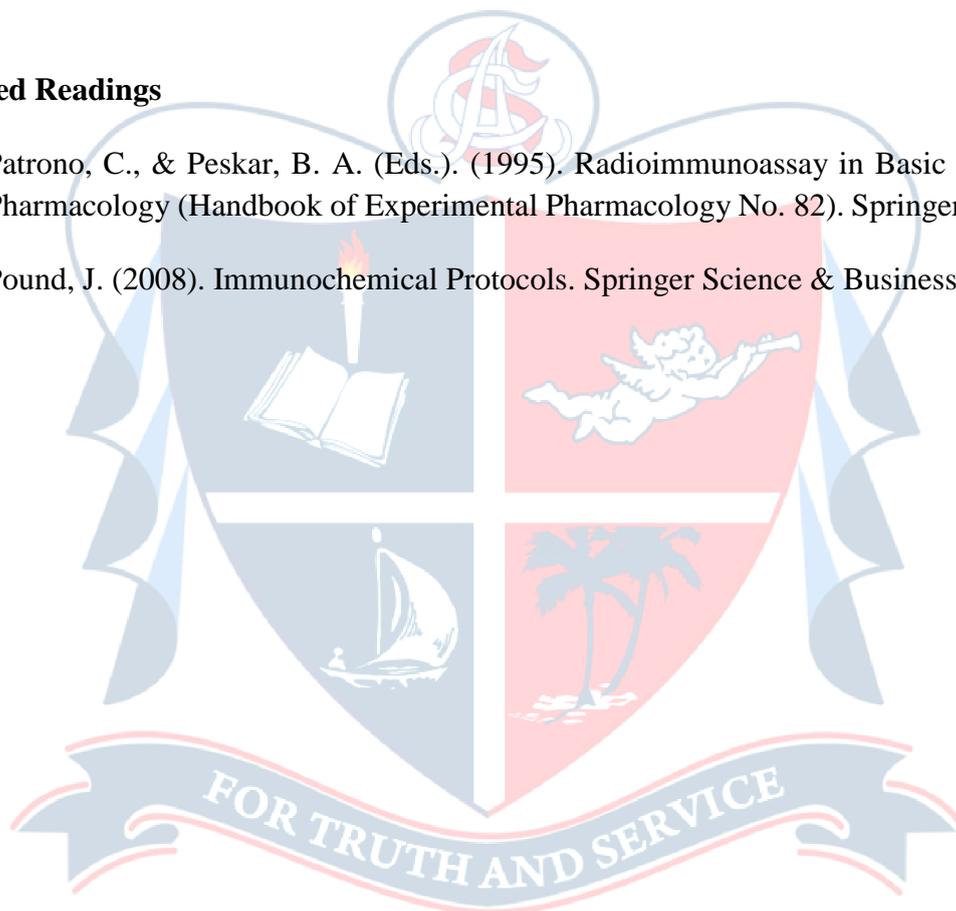
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2. Butler, J. M. (2005). Forensic DNA Typing. Academic Press Publishers.
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4. Jain, J. L., Jain, S., & Jain, N. (2022). Fundamentals of Biochemistry. S. Chand Publishing
5. Murphy, D. B. (2012). Fundamentals of Light Microscopy and Electronic Imaging. Wiley-Blackwell Publishers.
6. Tang, Y. W., & Stratton, C. W. (2010). Advanced Techniques in Diagnostic Microbiology. Springer New York, NY.
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### Suggested Readings

1. Patrono, C., & Peskar, B. A. (Eds.). (1995). Radioimmunoassay in Basic and Clinical Pharmacology (Handbook of Experimental Pharmacology No. 82). Springer Publishers.
2. Pound, J. (2008). Immunochemical Protocols. Springer Science & Business Media





## Department of Biochemistry St. Albert's College (Autonomous) Ernakulam

<b>Programme</b>	<b>Biochemistry MDC</b>					
<b>Course Name</b>	<b>Food as Medicine</b>					
<b>Type of Course</b>	<b>MDC</b>					
<b>Course Code</b>	<b>24SACBCH3MD101</b>					
<b>Course Level</b>	<b>200-299</b>					
<b>Course Summary</b>	This course is designed to equip students with a deep understanding of the dynamic relationship between food, nutrition, and health, with a focus on practical applications and real-world experiences. The curriculum contributes to a holistic education in the field of nutrition and health.					
<b>Semester</b>	3	Credits			3	Total Hours
<b>Course Details</b>	Learning Approach	Lecture	Tutorial	Practical	Others	
		3	0	0	0	45
<b>Pre-requisites, if any</b>	Nil					

### COURSE OUTCOMES (CO)

CO No.	Expected Course Outcome	Learning Domains *	PO No
1	Develop an appreciation for the significance of health in fostering a high quality of life.	K,U, Ap	1,2,3,4,7, 10
2	Acquire information on energy requirements and recommended dietary allowances, facilitating a better understanding of the correlation between nutrition and overall well-being.	U, E, A	1,2,3,4,6,8
3	Attain knowledge about the roles, metabolism, and effects of nutrients.	U, A, E	1,2,3,4,6
4	Recognize the potential of different functional foods and nutraceuticals in enhancing human health.	K,U, A	1,2,3,4,6
5	Acquire knowledge about the principles of diet therapy and the application of various therapeutic diets	U, S,I	1,2,3,4,6, 10

6	Demonstrate the ability to utilize the knowledge in making informed food choices and achieving a well-balanced diet.	U, C, S	1,2,3,4,6, 10
<b>*Remember (K), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C), Skill(S), Interest (I) and Appreciation (Ap)</b>			

## COURSE CONTENT

### Content for Classroom transaction (Units)

Module	Units	Course description	Hrs	CO No.
<b>1. Food, Nutrition and Health</b>	1.1	Food for health promotion	2	1
	1.2	Functions of food – Physiological, psychological and socio - cultural functions, constituents of food and their functions.	3	1
	1.3	Introduction to Nutrition, BMR	2	2
	1.4	Carbohydrates, Proteins, Fats and Lipids	4	3
	1.5	Vitamins: Fat soluble and Water soluble vitamins	1	3
	1.6	Minerals: Micro minerals and Macro minerals	1	3
	1.7	Water Balance; Regulation of acid-base balance in the body	2	3
<b>2. Functional Foods</b>	2.1	Functional food of plant and animal origin, Probiotics, prebiotics and synbiotics	2	4
	2.2	Nutraceuticals- herbal nutraceuticals; Phytochemicals, phytosterols and other bioactive compounds	3	4
<b>3. Dietetics and Diet Therapy</b>	3.1	Objective of diet therapy; Principles of diet preparation and counselling.	5	5
	3.2	Therapeutic diets for disorders; Nutritional status assessment of the critically ill patients	5	5
	3.3	Diet in Allergy; Diet in febrile conditions; Diet in relation to deficiency diseases	5	5
	3.4	Preparation of dietary charts	3	6
	3.5	Comparative chart for nutraceutical plants	2	6
	3.6	Integrative workshop on dietetics	5	6
<b>4. Teacher specific content/ Teacher facilitated activities</b>				

<b>Teaching and Learning Approach</b>	<b>Classroom Procedure (Mode of transaction)</b> Direct Instruction: Brainstorming lecture, E-learning Interactive session: Seminar, Group Assignments, Library work and Group discussion, Presentation by individual student, real world application
<b>Assessment Types</b>	<b>MODE OF ASSESSMENT</b>  <b>A. Continuous Comprehensive Assessment (CCA) 25 marks</b>  1. Internal test paper 2. Seminar presentation/Quiz 3. Assignments and group discussion 4. Viva 5. Report of the workshop (2 marks)
	<b>B. End Semester Examination</b>  Written examination for one and a half hours (50 marks)  MCQ(20 OUT OF 20)20X1=20 Marks Short Answer Questions(6 out of 9)6x5=30 Marks

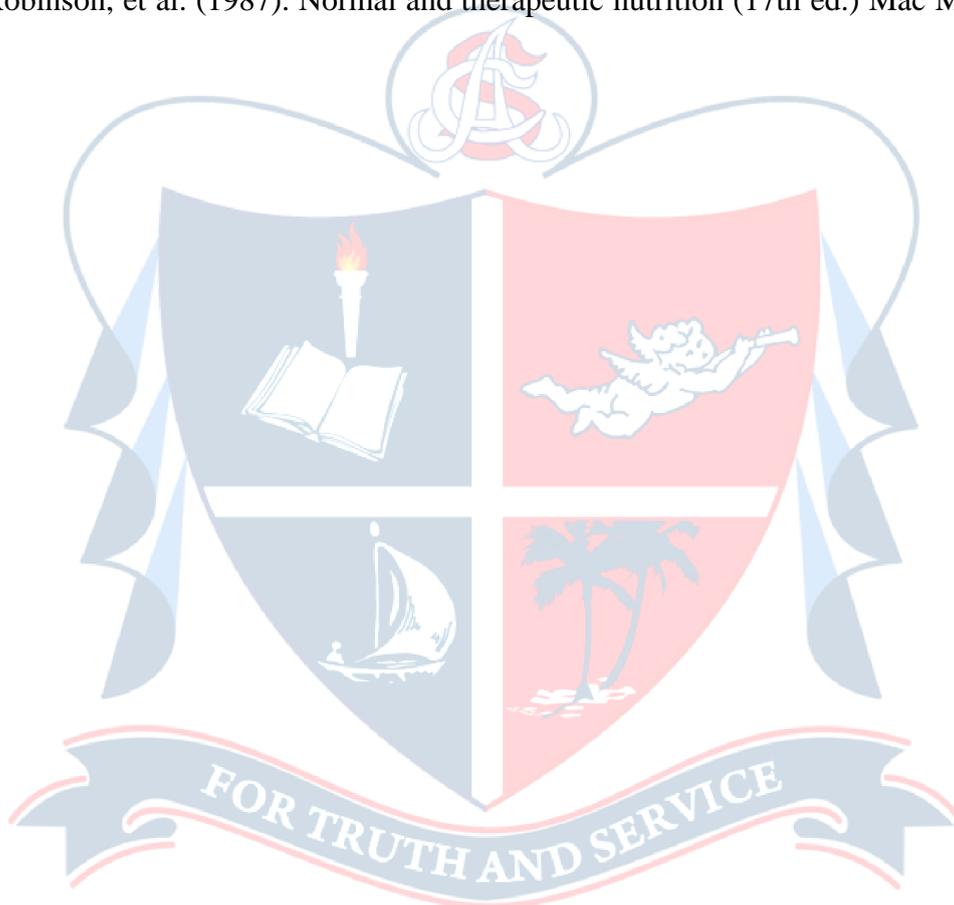
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- Ghosh, D., et al. (2012). Innovations in Healthy and Functional Foods. CRC Press.
- Krause, L., & Mahan, S. (Eds.). (1992). Food, nutrition, and diet therapy (6th ed.). W.B. Saunders Company.
- Madhavi, D. L., Deshpande, S. S., & Salunkhe. (1995). Food Antioxidants: Technological, Toxicological and Health Perspective. CRC Press.
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- Sizer, F., & Whitney, E. (2000). Nutrition concepts and controversies (8th ed.).
- Srilakshmi. (2002). Dietetics (4th ed.). New Age International (P) Limited, Publishers.

9. Swaminathan, M. (Ed.). (2007). Essentials of food & nutrition (Vol. II). Bappco.
10. Whitney, P. N., & Roes, S. R. (1996). Understanding nutrition. West Publication Co.
11. Wildman, R. E. C. (2001). Handbook of Nutraceutical and Functional Foods. CRC Press.
12. Yadav, S. (1997). Basic principles of nutrition (1st ed.).

### **Suggested Reading**

1. Antia, F. P. (1987). Clinical dietetics and nutrition. Oxford University Press.
2. Robinson, et al. (1987). Normal and therapeutic nutrition (17th ed.) Mac MillanP





## Department of Biochemistry St. Albert's College (Autonomous) Ernakulam

<b>Programme</b>	<b>Biochemistry ( Value Added Course)</b>					
<b>Course Name</b>	<b>Microplastics and Environment</b>					
<b>Type of Course</b>	<b>VAC</b>					
<b>Course Code</b>	<b>24SACBCH3VA101</b>					
<b>Course Level</b>	<b>200-299</b>					
<b>Course Summary</b>	This course offers an in-depth knowledge of the origins, destiny, movement, and effects of microplastics within the environment. Students will analyze the consequences of microplastic pollution and explore potential strategies for alleviation and control.					
<b>Semester</b>	3	Credits			3	Total Hours
<b>Course Details</b>	Learning Approach	Lecture	Tutorial	Practical	Others	
		3	0	0	0	45
<b>Pre-requisites,ifany</b>	Nil					

### COURSE OUTCOMES (CO)

CO No.	Expected Course Outcome	Learning Domains*	PO No
1	Discuss the sources and types of microplastics	K, U	1,2,3,4
2	Analyze the transport and fate of micro plastics in various environmental compartments	U, An, E	1,2,3, 4,7,10
3	Evaluate impacts of microplastic pollution on aquatic and terrestrial ecosystems.	U, E, I	1,2,3, 6,8
4	Explore the effects of microplastics in food and drinking water	U, A, I	1,2,3, 6
5	Evaluate health risks along with regulatory perspectives, concerning the impact of microplastics on biological systems.	E, A	2,3,6, 8,10
6	Develop strategies for mitigating and managing microplastic pollution	U, A, Ap	1,2,6,7, 8,10

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

**COURSE CONTENT**

Module	Units	Course description	Hrs	CO No.
<b>1. Introduction to Microplastics</b>	1.1	Overview of microplastics: definition, classification, and size range	2	1
	1.2	Sources of microplastics: primary and secondary sources	2	1
	1.3	Types of microplastics, microbeads, microfiber, Degradation	3	1
	1.4	Environmental pathways: air, water, soil	3	2
<b>2. Fate and Transport of Microplastics</b>	2.2	Bioaccumulation and biomagnification	5	2
	2.3	Microplastic transport in different ecosystems	5	2
<b>3. Impact of Microplastics on biological systems and climate change &amp; Microplastic Removal</b>	3.1	Effects of microplastics on marine and freshwater Ecosystems	3	3
	3.2	Impact on terrestrial ecosystems, wildlife exposure and responses	3	3
	3.3	Microplastics in food and drinking water	4	4
	2.4	Health risks and uncertainties, Regulatory perspectives	5	5
	2.5	Impact of Microplastics on climate change	5	6
	2.6	Microplastic removal strategies	5	6
<b>4. Teacher specific content/ Teacher facilitated activities</b>				

<b>Teaching and Learning Approach</b>	<b>Classroom Procedure (Mode of transaction)</b> Direct Instruction: Lecture, tutorials, e resources, animated videos, virtual lab Indirect session: Group discussion, assignments
<b>Assessment Types</b>	<b>MODE OF ASSESSMENT</b> <b>A. Continuous Comprehensive Assessment (CCA) 25 marks</b> 1. Multiple Choice Questions 2. Seminar presentation 3. Assignment and discussions 4. Viva 5. Report of awareness programmes and seminars 6. Report of field visit

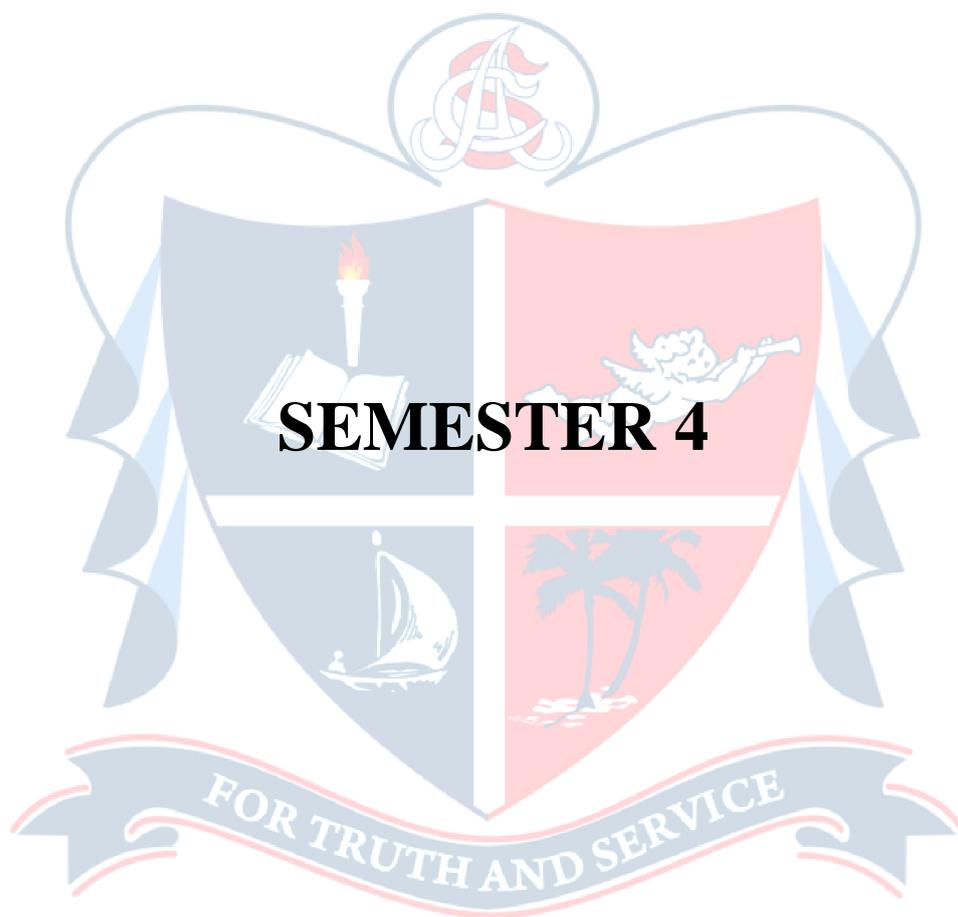
<b>B. End Semester Examination</b>  Written examination for one and a half hours (50 marks)  MCQ(20 OUT OF 20)20X1=20 Marks  Short Answer Questions(6 out of 9)6x5=30 Marks
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## References

1. Bank, M. S. (2022). Microplastic in the environment: Pattern and process. In Environmental Contamination Remediation and Management. Springer.
2. Cole, M., Lindeque, P., Halsband, C., & Galloway, T. S. (2011). Microplastics as contaminants in the marine environment: A review. *Marine Pollution Bulletin*, 62(12), 2588-2597.
3. Geyer, R., Jambeck, J. R., & Law, K. L. (2017). Production, use, and fate of all plastics ever made. *Science Advances*, 3(7), 1700782.
4. Wright, S. L., & Kelly, F. J. (2017). Plastic and human health: A micro issue? *Environmental Science & Technology*, 51(12), 6634-6647.
5. Ziajahromi, S., Neale, P. A., Rintoul, L., Leusch, F. D., & Wasternack, D. (2017). Occurrence and fate of microplastics in wastewater treatment plants: Implication to environmental management. *Water Research*, 123, 448-456.

## Suggested Readings

1. Hester, R. E., & Harrison, R. M. (2019). Plastics and the environment. In *Issues in Environmental Science and Technology*. Royal Society of Chemistry





## Department of Biochemistry St. Albert's College (Autonomous) Ernakulam

<b>Programme</b>	<b>Biochemistry Minor</b>					
<b>Course Name</b>	<b>Metabolism of Carbohydrates, Proteins and Lipids</b>					
<b>Type of Course</b>	<b>DSC C</b>					
<b>Course Code</b>	<b>24SACBCH4DC101</b>					
<b>Course Level</b>	<b>200-299</b>					
<b>Course Summary</b>	This course offers a thorough examination of the biochemical processes that regulate the metabolism and corresponding energetics of carbohydrates, proteins, and lipids in living organisms.					
<b>Semester</b>	4	Credits			4	Total Hours
<b>Course Details</b>	Learning Approach	Lecture	Tutorial	Practical	Others	
		3	0	1	0	75
<b>Pre-requisites, if any</b>	Nil					

### COURSE OUTCOMES (CO)

CO No.	Expected Course Outcome	Learning Domains*	PO No
1	Describe the mechanisms involved in the digestion and absorption of carbohydrates, proteins, and lipids	K, U, E	1,2,3,4
2	Explain the enzymatic reactions and energetics of breakdown and synthesis of carbohydrates	U, E	1,2,3,4,6
3	Discuss the processes and pathways involved in protein Metabolism	U, An,E	1,2,3,4
4	Compare the catabolic and anabolic pathways of lipids	U, An,	1,2,3,4
5	Analyze and calculate energy yield in oxidation of Palmitic acid	An, A, S	1,2,3,4,6
6	Develop practical skills to determine the amount of carbohydrates, lipids and amino acids in a biological source	An, S, Ap	1,2,3,6,9, 10

**\*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.
<b>1. Metabolism of Carbohydrates</b>	1.1	Introduction to carbohydrate metabolism, Digestion and Absorption	1	1
	1.2	Glycolysis (with structure), Energetics and its Regulation (Over view)	2	2
	1.3	Fates of Pyruvate and TCA Cycle and energetics	3	2
	1.4	Electron Transport Chain and Oxidative Phosphorylation	2	2
	1.5	Gluconeogenesis (With Structure)	2	2
	1.6	HMP Shunt Pathway (structure not necessary)	2	2
	1.7	Glycogen Metabolism -Glycogenolysis and Glycogenesis	3	2
<b>2. Metabolism of Proteins</b>	2.1	Introduction to protein metabolism, Digestion and Absorption	3	1
	2.2	Oxidation of amino acids- transamination, deamination, (oxidative and Nonoxidative), Decarboxylation	4	3
	2.3	Glucogenic and ketogenic amino acids	2	3
	2.4	Nitrogen excretion, Urea cycle (structure Not necessary)	3	3
	2.5	Inborn errors of Protein metabolism – albinism, Alkaptonuria, Phenylketonuria (defensive enzyme, Symptoms and effects)	3	3
<b>3. Lipid Metabolism</b>	3.1	Lipids- Introduction to Lipid metabolism, Digestion, Absorption	3	1
	3.2	Fatty acid Oxidation-Alpha, Beta, Omega(Overview)	2	4
	3.2	Beta Oxidation (Activation, Transport with structure), Energy yield in oxidation of Palmitic acid, Ketone bodies	5	5
	3.4	Fatty acid synthesis (in detail), Desaturases and elongases (outline only)	5	4
<b>4.</b>	4.1	Beer Lamberts law verification (Mandatory)	6	6

<b>Practical</b>				
	4.2	Estimation of carbohydrates (Anthrone Method, Di Nitro Salicylic acid, Folin Wu Method, Nelsons –Any 2)	6	6
	4.3	Protein Estimation (Lowry and Biuret method)	6	6
	4.4	Amino acid estimation (ninhydrin Method)	3	6
	4.5	Estimation of Cholesterol	3	6
	4.6	Enzymatic breakdown of starch	6	6
<b>5. Teacher specific content/ Teacher facilitated activities</b>				

<b>Teaching and Learning Approach</b>	<p><b>Classroom Procedure (Mode of transaction)</b></p> <p>Direct instruction: Lecture, E-learning</p> <p>Indirect session: Seminars, Power point presentations, Group discussions, Questions and clarifications, Assignments, Laboratory sessions including demonstrations, hands on training</p>
<b>Assessment Types</b>	<p><b>MODE OF ASSESSMENT</b></p> <p><b>A. Continuous Comprehensive Assessment (CCA)</b></p> <p>Theory 25 marks</p> <ol style="list-style-type: none"> <li>Poster making/model building</li> <li>Seminar presentation/Quiz</li> <li>Involvement in group discussion</li> <li>Multiple Choice questions</li> <li>Assignment</li> <li>Open book test</li> </ol> <p>Practical 5 marks*</p> <ol style="list-style-type: none"> <li>Viva (1 marks)</li> <li>Record (1 marks)</li> <li>Laboratory involvement &amp; Exam (3 marks)</li> </ol> <p>*This mark to be converted to 7.5 marks</p> <p><b>B. End Semester Examination</b></p> <p>Written examination for one and a half hours (50 marks)</p> <p>MCQ (20 OUT OF 20) 20x1=20 Marks.</p> <p>Short Answer Questions (4 out of 6) 4x5=20 Marks.</p>

	<p>Essay ( 1 out of 2)1x10=10 Marks</p> <p>Practical examination (20 marks)*</p> <p>*This mark to be converted to 17.5 marks</p> <p>1.Viva (15 marks)</p> <p>2.Record (3 marks)</p> <p>3.Laboratory involvement &amp; Exam (2 marks)*</p> <p>This mark to be converted to 17.5 marks</p>
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### References

1. Nelson, D. L. (2005). Lehninger Principles of Biochemistry. New York: W.H.Freeman.
2. Murray, R., Granner, D., Mayes, P., & Rodwell, V. (2006). Harper's Illustrated Biochemistry (Harper's Biochemistry) (27th ed.). McGraw-Hill Medical.
3. Voet, D., J. G., & Pratt, C. W. (2016). Fundamentals of Biochemistry (5<sup>th</sup> ed.) John Wiley & Sons
4. Jain, J. L., Jain, S., & Jain, N. (2022). Fundamentals of Biochemistry. S. Chand Publishing.
5. Vasudevan, D. M., & Sreekumari, S. (2022). Textbook of Biochemistry or Medical Students. Jaypee Brothers Medical Publishers

### Suggested Readings

1. McKee, T., & McKee, J. R. (2009). Biochemistry: The Molecular Basis of Life. Oxford University Press.
2. Berg, J. M., Tymoczko, J. L., & Stryer, L. (2007). Biochemistry. W. H. Freeman



## Department of Biochemistry St. Albert's College (Autonomous) Ernakulam

<b>Programme</b>	<b>Biochemistry( Skilled Enhancement Course)</b>					
<b>Course Name</b>	<b>Biochemical Tests in Disease Diagnosis</b>					
<b>Type of Course</b>	<b>SEC</b>					
<b>Course Code</b>	<b>24SACBCH4SEC101</b>					
<b>Course Level</b>	<b>200-299</b>					
<b>Course Summary</b>	This course provides a focused exploration of the clinical significance of biochemical tests in the field of disease diagnosis. Its aim is to equip students with the essential knowledge and abilities to identify and apply biochemical tests, facilitating accurate and efficient monitoring and treatment of various diseases.					
<b>Semester</b>	4	Credits			3	Total Hours
<b>Course Details</b>	Learning Approach	Lecture	Tutorial	Practical	Others	
		3	0	0	0	45
<b>Pre-requisites,if any</b>	Nil					

### COURSE OUTCOMES (CO)

CO No.	Expected Course Outcome	Learning Domains *	PO No
1	Explain the fundamentals of biochemical tests used in disease diagnosis and the ethical practices	U, E, A	1,2,3,4,6,8
2	Discuss the various methods for collecting blood, urine and CSF, ensuring accuracy and patient comfort.	K, U, E	1,2,3,4,6
3	Interpret blood analysis results accurately and communicate these findings effectively.	A, An, E, Ap	1,2,3,4,6,10
4	Develop a comprehensive understanding of various tests used in diagnosing and monitoring diabetes	U, An, E	1,2,6,8
5	Explore the identification and applications of biomarkers in liver function Tests	U, A, An	1,2,3,4

6	Attain proficiency in accurately interpreting results of thyroid function tests results	An, E, S	1,2,3, 9, 10
7	Evaluate how results of renal function test aid in diagnosing and monitoring kidney diseases	An, E, I	1,2,3,9
8	Enhance the ability to present and communicate observations obtained from experiments, laboratory visits, as well as share insights on emerging techniques.	E, An, S	1,2,4, 9, 10
<b>*Remember (K), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C), Skill(S), Interest (I) and Appreciation (Ap)</b>			

## COURSE CONTENT

Content for Classroom transaction (Units)

Module	Units	Course description	Hrs	CO No.
<b>1. Introduction to Biochemical tests</b>	1.1	Overview of biochemical tests and its importance in disease diagnosis, Ethical practices in laboratory Medicine	3	1
	1.2	Sample collection and handling of blood, urine and cerebrospinal fluid.	3	2
	1.3	Blood routine analysis- Erythrocyte Sedimentation Rate (ESR), Hemoglobin (Hb), Red Blood Cell (RBC) Count , White Blood (WBC) Count , Platelets, Differential Count (DC), Packed Cell Volume (PCV)	5	3
	1.4	Lipid profiling - Total cholesterol, High Density Lipoprotein(HDL) Cholesterol, Low Density Lipoprotein (LDL) Cholesterol, Triglyceride (TG)	4	3
<b>2. Common biochemical tests in diagnosis and their clinical interpretation</b>	2.1	Tests related to Diabetes Mellitus -Fasting Blood Sugar FBS, Post Prandial Blood Sugar (PPBS), Random Blood Sugar (RBS), Glycosylated	3	4
	2.2	Hemoglobin (HbA1C), Glucose Challenge Test (GCT), Glucose Tolerance Test (GTT)	3	4
	2.3	Liver Function Test– Total protein, Albumin, Globulin A/G ratio, Total bilirubin, Serum Glutamate Oxaloacetate Transaminase (SGOT), Serum Glutamate Pyruvate Transaminase (SGPT), Alkaline Phosphatase (ALP), Alpha Feto Protein (AFP).	3	5

	2.4	Thyroid Function Tests-Thyroid Stimulating Hormone (TSH), T3,T4, Thyroxine Binding Globulin antibody(antithyroglobulin), Thyroid peroxidase antibody (TPO)	3	6
	2.5	Renal Function Tests-Urea, Creatinine, Uric acid	2	7
	2.6	Emerging technologies in biochemical testing	1	8
<b>3. Laboratory visit and Case study</b>	3.1	Laboratory Visit and Report Submission	8	8
	3.2	Case Study-Interpretation of a clinical Laboratory report	7	8
<b>4. Teacher specific content/ Teacher facilitated activities</b>				

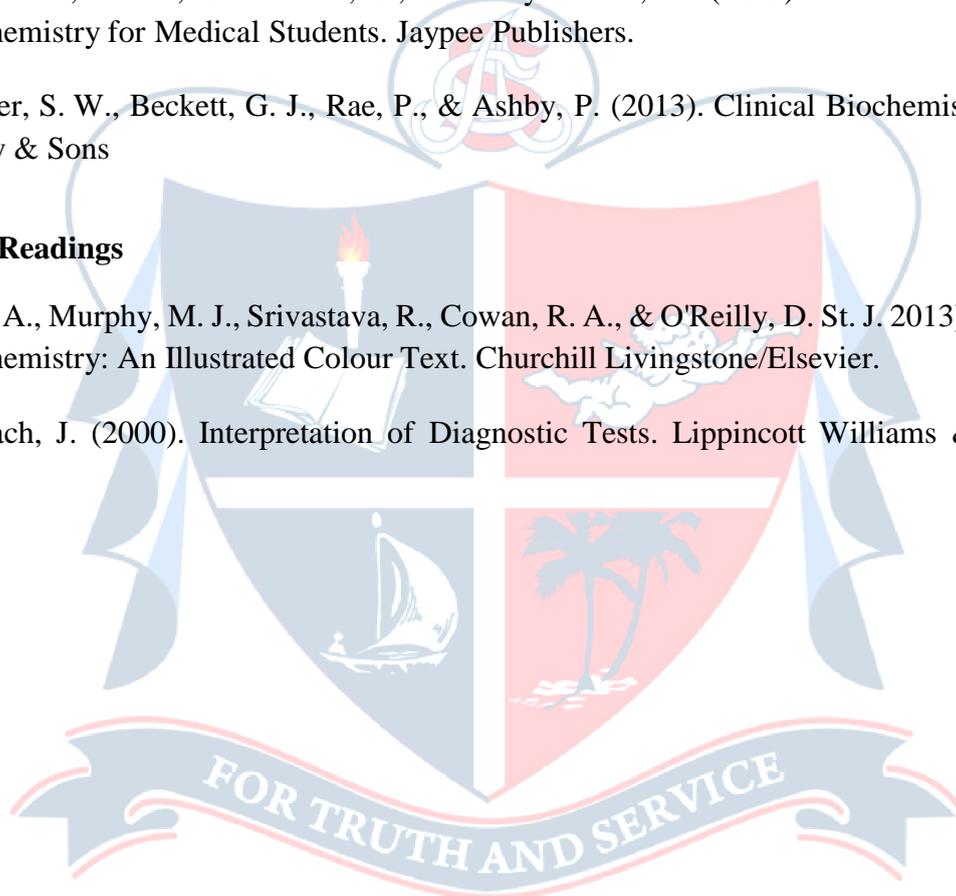
<b>Teaching and Learning Approach</b>	<p><b>Classroom Procedure (Mode of transaction)</b></p> <p>Direct Instruction: Lecture, tutorials, e resources, animated videos Indirect session: Group discussion, assignments Practical: case study, laboratory visit</p>
<b>Assessment Types</b>	<p><b>MODE OF ASSESSMENT</b></p> <p><b>A. Continuous Comprehensive Assessment (CCA) 25 marks</b></p> <ol style="list-style-type: none"> <li>1. MCQ test for one and a half hour</li> <li>2. Assignment</li> <li>3. Involvement in group discussion</li> <li>4. Viva</li> <li>5. Case study report</li> <li>6. Report of Laboratory visit</li> </ol> <p><b>B. End Semester Examination</b></p> <p>Written examination of one and a half hours (50 marks)</p> <p>MCQ(20 OUT OF 20)20X1=20 Marks</p> <p>Short Answer Questions(6 out of 9)6x5=30 Marks</p>

## References

1. Bishop, M. L., Fody, E. P., & Schoeff, L. E. (2013). Clinical Chemistry: Principles, Techniques, and Correlations (7th ed.)
2. Burtis, C. A., & Bruns, D. E. (2005). Tietz Fundamentals of Clinical Chemistry and Molecular Diagnostics. Elsevier (8th ed.).
3. Goldberg, S. (2010). Clinical Biochemistry Made Ridiculously Simple. MedMaster Inc.
4. Vasudevan, D. M., Sreekumari, S., & Vaidyanathan, K. (2023). Textbook of Biochemistry for Medical Students. Jaypee Publishers.
5. Walker, S. W., Beckett, G. J., Rae, P., & Ashby, P. (2013). Clinical Biochemistry. John Wiley & Sons

## Suggested Readings

1. Gaw, A., Murphy, M. J., Srivastava, R., Cowan, R. A., & O'Reilly, D. St. J. (2013). Clinical Biochemistry: An Illustrated Colour Text. Churchill Livingstone/Elsevier.
2. Wallach, J. (2000). Interpretation of Diagnostic Tests. Lippincott Williams & Wilkins.





## Department of Biochemistry St. Albert's College (Autonomous) Ernakulam

<b>Programme</b>	<b>Biochemistry( Value Added Courses)</b>					
<b>Course Name</b>	<b>Narcotics and Psychotropic Substances</b>					
<b>Type of Course</b>	<b>VAC</b>					
<b>Course Code</b>	<b>24SACBCH4VA101</b>					
<b>Course Level</b>	<b>200-299</b>					
<b>Course Summary</b>	This course seeks to equip students with knowledge that goes beyond conventional limits, encouraging critical thinking and well-informed decision-making in both personal and professional realms. Student's will gain insight into the fundamental principles governing the utilization, impacts, and control of narcotics and psychotropic drugs.					
<b>Semester</b>	4	Credits			3	Total Hours
<b>Course Details</b>	Learning Approach	Lecture	Tutorial	Practical	Others	
		3	0	0	0	45
<b>Pre-requisites, if any</b>	Nil					

### COURSE OUTCOMES (CO)

CO No.	Expected Course Outcome	Learning Domains *	PO No
1	Demonstrate how narcotics and psychotropic drugs interact with the human body	K, U, E	1,2,4, 8
2	Describe the different classes of NDPSSs, their mechanism of action	K, U, An	1, 2,3,4
3	Analyse the potential risks associated with the use of narcotics and psychotropic drugs	U, An, I	1,2,3, 6
4	Evaluate the mechanism for drug addiction and formulate management strategies	U, E, A	1,2,3, 4,8
5	Assess the legal and ethical implications of using narcotics and psychotropic substances.	U, E, I, Ap	1,2,3,4 6,8
6	Communicate and educate effectively about the risks, benefits, and responsible use of narcotics and psychotropic substances, orally/writing, to diverse communities	U, E, C,S, Ap	2,4,5, 6 8,9,10
*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.
<b>1. Overview of NDPSs</b>	1.1	Introduction to NDPSs, understanding the basic principles of how drugs interact with the body, including pharmacokinetics (how the body affects the drug) and pharmacodynamics (how the drug affects the body).	5	1
	1.2	Study of narcotic drugs, their classification, mechanisms of action (in brief), therapeutic uses, and potential for abuse or addiction. Examples include opioids like morphine, heroin, oxycodone	5	2
	1.3	Exploring drugs that affect mental processes, including antipsychotics, antidepressants, anxiolytics, and mood stabilizers. Study of their mechanism of action, indications, and potential side effects. Examples include MDMA, LSD, Barbiturates	5	3
<b>2. Addiction and Dependence</b>	2.1	Investigation of the physiological and psychological mechanisms behind drug addiction and dependence. This include studying tolerance, withdrawal symptoms	6	4
	2.2	Strategies for managing addiction.	3	4
	2.3	Narcotic Drugs and Psychotropic substances Act 1985 -use, prescription, and distribution of narcotics and psychotropic drugs.	6	5
<b>3. Deaddiction centre visit and awareness programmes</b>	3.1	Conduct of awareness programmes	10	6
	3.2	Deaddiction centre visit and submission of report	5	6
<b>4. Teacher specific content/ Teacher facilitated activities</b>				

<b>Teaching and Learning Approach</b>	<b>Classroom Procedure (Mode of transaction)</b> Direct Instruction: Lecture, tutorials, e resources, animated videos Indirect session: Group discussion, assignments, seminar presentation, involvement in awareness programmes, Deaddiction centre visit
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<b>Assessment Types</b>	<b>MODE OF ASSESSMENT</b>
	<p><b>A. Continuous Comprehensive Assessment (CCA) 25 marks</b></p> <ol style="list-style-type: none"> <li>1. MCQ test for one hour</li> <li>2. Assignment Involvement in group discussion</li> <li>3. Viva</li> <li>4. Involvement in awareness programmes</li> <li>5. seminar presentation</li> <li>6. Report of deaddiction centre visit</li> </ol>
	<p><b>B. End Semester Examination</b></p> <p>Written Examination of one and a half hours (50 marks)</p> <p>MCQ(20 OUT OF 20)20X1=20 Marks</p> <p>Short Answer Questions(6 out of 9)6x5=30 Marks</p>

### References

1. Jeffries, J. J. (Ed.), Bezchlibnyk-Butler, K. Z. (Ed.), & Procyshyn, R. M. (Ed.). (2021). Clinical Handbook of Psychotropic Drugs. Hogrefe Publishing.
2. Knollmann, B., & Brunton, L. (2022). Goodman and Gilman's The Pharmacological Basis of Therapeutics [Hardcover]. McGraw-Hill Education.
3. Liese, B. S., & O'Connor, C. K. (2006). Substance Use Disorders: A Practical Guide (2nd ed.). Lippincott Williams & Wilkins.
4. Pagliaro, L. A., & Pagliaro, A. M. (2004). Pagliaros' Comprehensive Guide to Drugs and Substances of Abuse. American Pharmacists Association.
5. Tozer, T. N., & Rowland, M. (2006). Introduction to Pharmacokinetics and Pharmacodynamics: The Quantitative Basis of Drug Therapy [Paperback]. Lippincott Williams and Wilkins.
6. The Narcotic Drugs and Psychotropic Substances Act, 1985.

### Suggested Readings

1. Abadinsky, H. (2017). Drug Use and Abuse: A Comprehensive Introduction (9th ed.). Cengage Learning.
2. Stahl, S. M., & Muntner, N. (2013). Stahl's Essential Psychopharmacology: Neuroscientific Basis and Practical Applications (4th ed.). Cambridge University Press





## Department of Biochemistry St. Albert's College (Autonomous) Ernakulam

<b>Programme</b>	<b>Biochemistry( Skilled Enhancement Course)</b>					
<b>Course Name</b>	<b>Forensic Impression analysis</b>					
<b>Type of Course</b>	<b>SEC</b>					
<b>Course Code</b>	<b>24SACBCH7SEC101</b>					
<b>Course Level</b>	<b>300-399</b>					
<b>Course Summary</b>	This course equips students with the knowledge and skills needed to effectively analyse and interpret various types of impressions, providing them with a solid foundation for a career in forensic science and criminal investigations.					
<b>Semester</b>	6	<b>Credits</b>			3	<b>Total Hours</b>
<b>Course Details</b>	Learning Approach	Lecture	Tutorial	Practical	Others	
		2	0	1	0	60
<b>Pre-requisites,ifany</b>	Nil					

### COURSE OUTCOMES (CO)

CO No.	Expected Course Outcome	Learning Domains *	PO No
1	Describe the basic requirements for a forensic impression analysis	K, U	1,2,3
2	Discuss the fingerprint development and examination methods	U, E, A	1,2,3, 4,6
3	Demonstrate the recording and examination of finger print on living and dead body	U, E, A	1,2,3, 4,6
4	Illustrate the development, comparison and casting of foot, lip and tyre impressions	A, E, C	1,2,3, 6,8
5	Attain skill in fingerprint analysis.	An, I, Ap	1,2,3, 6,8
6	Create presentation of reports in courts	C, S, I	1,2,3, 6,8

**\*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 (Units))**

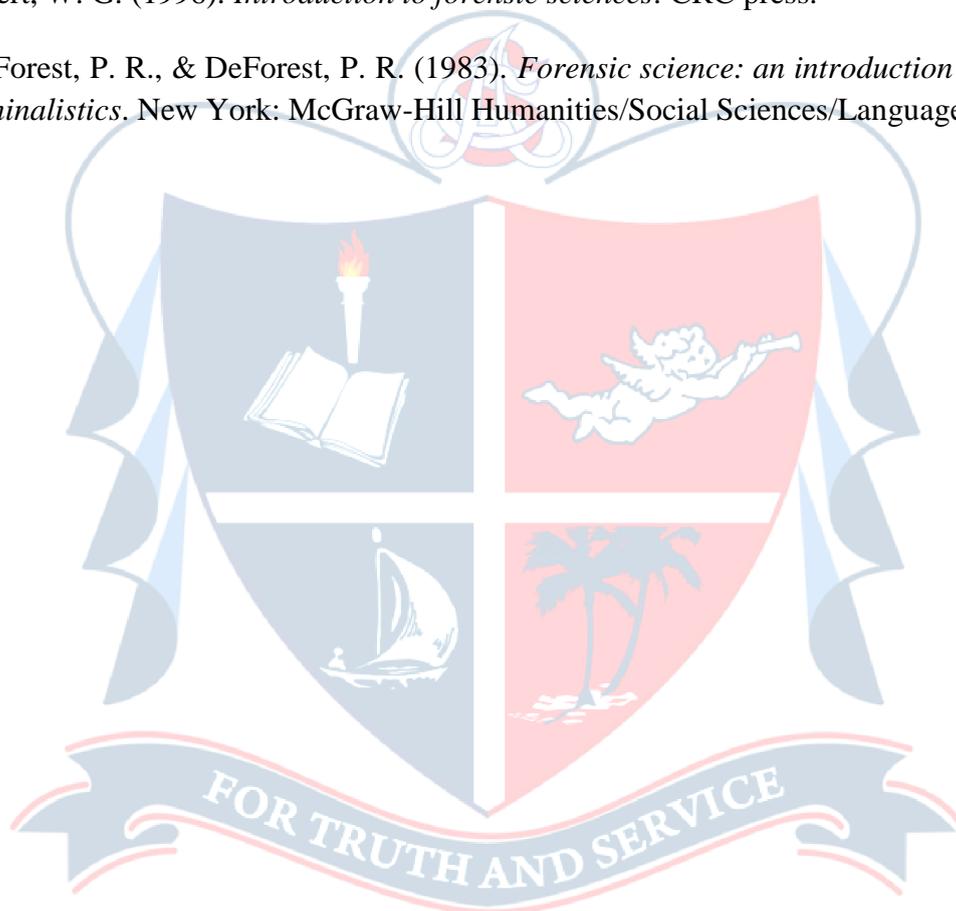
<b>Teaching and Learning Approach</b>	<b>Classroom Procedure (Mode of transaction)</b> Direct Instruction: Brainstorming lecture, E-learning, Interactive session: Seminar, Individual Assignment, Library work and Group discussion, Presentation by student, Peer evaluation, laboratory sessions
<b>Assessment Types</b>	<b>MODE OF ASSESSMENT</b> <b>A. Continuous Comprehensive Assessment (CCA)</b> Theory 15 marks <ol style="list-style-type: none"> <li>1. Poster making/model building</li> <li>2. Seminar presentation/Quiz</li> <li>3. Involvement in group discussion</li> <li>4. Assignment</li> </ol> Open book test Practical 10 marks* <ol style="list-style-type: none"> <li>1. Viva (2 marks)</li> <li>2. Record (3 marks)</li> <li>3. Laboratory involvement &amp; Exam (5 marks)</li> </ol> *This mark to be converted to 7.5 marks
	<b>B. End Semester Examination</b> Written examination for one hour (35 marks)  MCQ (15 OUT OF 15) 15x1=15 Marks. Short Answer Questions (4 out of 6) 4x5=20 Marks.  Practical examination (15 marks) <ol style="list-style-type: none"> <li>1. Viva (2 marks)</li> <li>2. Record (3 marks)</li> <li>3. Laboratory involvement &amp; Exam (10 marks)</li> </ol> *This mark to be converted to 17.5 marks

**References**

1. Houck, M. M., & Siegel, J. A. (2009). *Fundamentals of forensic science*. Academic Press.
2. Datta, A. K., Lee, H. C., Ramotowski, R., & Gaensslen, R. E. (2001). *Advances in fingerprint technology*. CRC press.
3. Ashbaugh, D. R. (1999). *Quantitative-qualitative friction ridge analysis: an introduction to basic and advanced ridgeology*. CRC press.
4. Champod, C., Lennard, C. J., Margot, P., & Stoilovic, M. (2004). *Fingerprints and other ridge skin impressions*. CRC press.
5. Ferry, T. S. (1988). *Modern accident investigation and analysis*. John Wiley & Sons.

### Suggested Readings

1. Siegel, J. A., & Saukko, P. J. (2012). *Encyclopedia of forensic sciences*. Academic Press.
2. Jamieson, A., & Moenssens, A. (2009). *Wiley Encyclopedia of Forensic Science, 5 Volume Set*. John Wiley & Sons.
3. Payne-James, J., & Byard, R. (2015). *Encyclopedia of forensic and legal medicine*. Academic Press.
4. Eckert, W. G. (1996). *Introduction to forensic sciences*. CRC press.
5. De Forest, P. R., & DeForest, P. R. (1983). *Forensic science: an introduction to criminalistics*. New York: McGraw-Hill Humanities/Social Sciences/Languages





## Department of Biochemistry St. Albert's College (Autonomous) Ernakulam

<b>Programme</b>	<b>Biochemistry(Value Added Course)</b>					
<b>Course Name</b>	<b>Environmental Biochemistry and Human Rights</b>					
<b>Type of Course</b>	<b>VAC</b>					
<b>Course Code</b>	<b>To be prepared by the college.</b>					
<b>Course Level</b>	<b>300-399</b>					
<b>Course Summary</b>	This course offers a comprehensive understanding of the intricate relationships within ecosystems and the importance of biodiversity, enabling them to analyse and contribute positively to environmental conservation and sustainability efforts. It also inculcate in students the need of understanding the basics of human rights.					
<b>Semester</b>	6	Credits			3	Total Hours
<b>Course Details</b>	Learning Approach	Lecture	Tutorial	Practical	Others	
		3	0	0	0	45
<b>Pre-requisites, if any</b>	Nil					

### COURSE OUTCOMES (CO)

CO No.	Expected Course Outcome	Learning Domains *	PO No
1	Review the basic concepts of the ecosystem.	K, U	2,3,6,7
2	Discuss the concept of biodiversity	K,U	2,3,4,6
3	Explain the pollution issues and waste management Challenges	U, E, An	3,6,7,8
4	Apply the knowledge of biosensors, bioremediation and biodegradation for environmental sustainability.	A, C	1,2,3
5	Debate the ethical dilemmas and complexities within human rights contexts.	E, I, Ap	6,7,8,10
6	Develop effective communication skills to articulate and convey human rights issues related to environment	E, C,A	2, 4,5 6,8

**\*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 (Units))**

<b>Module</b>	<b>Units</b>	<b>Course description</b>	<b>Hrs</b>	<b>CO No.</b>
<b>1. Basic concepts of Ecosystem</b>	1.1	Ecosystem-Concept of ecosystem, structure and function of ecosystem, producers, consumers, decomposers, abiotic components	1	1
	1.2	Ecological succession, Food chain, Food Web, Energy flow in ecosystem, ecological pyramids Biogeochemical cycles(N, C, P cycles)	2	1
	1.3	Biodiversity- concept of Biodiversity, Importance of Biodiversity, Types of diversity; Genetic diversity, Species diversity and Ecosystem diversity	2	2
<b>2. Pollution and its Management, Detection and Remediation</b>	2.1	Pollution: Definition and types - Air, water, soil, marine, noise pollution	3	3
	2.2	Treatment of wastewater- primary, secondary and tertiary treatment. Biological treatment of wastewater- aerobic methods, floc and film based processes, activated sludge process, trickling filter process, aerobic pond. Anaerobic process- methanogenesis, single and double stage reactors.	4	3
	2.3	Solid waste management- anaerobic treatment and land filling. Composting	3	3
	2.4	Biosensors - types and application in environmental pollution, detection and monitoring	5	4
	2.5	Bioremediation - constraints and priorities of bioremediation, evaluating bioremediation	5	4
	2.6	Biodegradation- factors affecting process of biodegradation, methods in determining Biodegradability	5	4
<b>3. Environment and Human Rights</b>	3.1	An Introduction to Human Rights, Meaning, concept and development, Three Generations of Human Rights(Civil and Political Rights; Economic, Social and Cultural Rights).	5	5
	3.2	Human Rights in India. Fundamental rights and Indian Constitution, Rights for children and women, Scheduled Castes, Scheduled Tribes, Other Backward Castes and Minorities.	5	5

	3.3	Environment and Human Rights - Right to Clean Environment and Public Safety: Issues of Industrial Pollution, Prevention, Rehabilitation and Safety	5	6
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#### 4. Teacher specific content/ Teacher facilitated activities

<b>Teaching and Learning Approach</b>	<b>Classroom Procedure (Mode of transaction)</b> Direct Instruction: Brainstorming lecture, E-learning Interactive session: Seminar, Individual Assignment, Library work and Group discussion, Presentation by student, Peer evaluation
<b>Assessment Types</b>	<b>MODE OF ASSESSMENT</b> <b>A. Continuous comprehensive Assessment (CIA) 25 marks</b> 1. Internal test 2. Seminar presentation 3. Assignment 4. Involvement in group discussion 5. Peer evaluation
	<b>B. End Semester Examination:</b> Written test for one and a half hours (50 marks) MCQ(20 OUT OF 20)20X1=20 Marks Short Answer Questions(6 out of 9)6x5=30 Marks

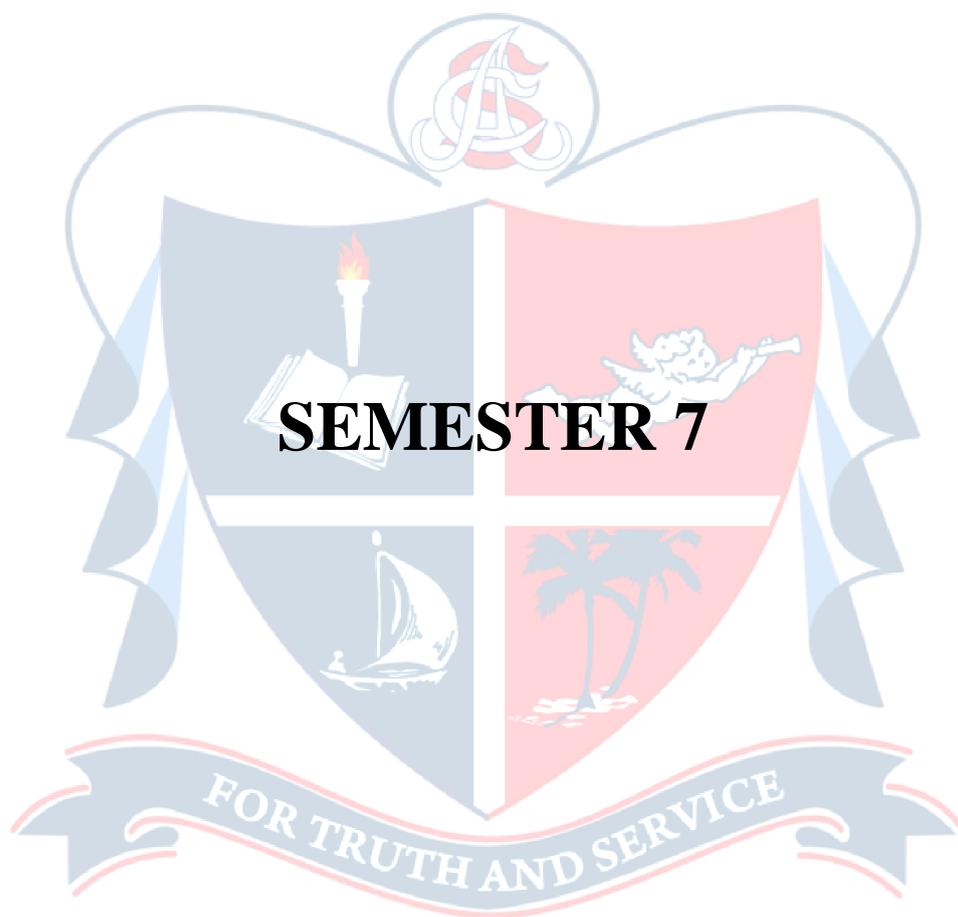
#### References

1. Bharucha, E. (2005). *Textbook of environmental studies for undergraduate courses*. University Press.
2. Mongillo, J. F., & Zierdt-Warshaw, L. (2000). *Encyclopedia of environmental science*. University Rochester Press.
3. Chiras, D. D. (2009). *Environmental science*. Jones & Bartlett Publishers.
4. Manahan, S. E. (2022). *Environmental chemistry*. CRC press.
5. Begon, M., Howarth, R. W., & Townsend, C. R. (2014). *Essentials of ecology*. John Wiley & Sons.
6. Alexander, D. E., & Fairbridge, R. W. (Eds.). (1999). *Encyclopedia of environmental science*. Springer Science & Business Media.

### Suggested Readings

1. Sodhi, G. S. (2005). *Fundamental concepts of environmental chemistry*. AlphaScienceInt'l Ltd..
2. Calow, P. P. (2009). *Encyclopedia of ecology and environmental management*. John Wiley & Sons.
3. Townsend, C. R., Begon, M., & Harper, J. L. (2003). *Essentials of ecology* (No.Ed. 2). Blackwell Science.
4. De Anil, K. (2003). *Environmental chemistry*. New Age International.
5. Miller, G. T. (2006). *Environmental science: Working with the earth*. Thomson Brooks/Cole.







## Department of Biochemistry St. Albert's College (Autonomous) Ernakulam

<b>Programme</b>	Biochemistry( Electives)					
<b>Course Name</b>	IPR and Bioethics					
<b>Type of Course</b>	24SACBCH7DE101					
<b>Course Code</b>	To be prepared by the college.					
<b>Course Level</b>	400-499					
<b>Course Summary</b>	The Intellectual Property Rights (IPR) and Bioethics course is designed to provide students with a comprehensive understanding of the legal and ethical dimensions of intellectual property rights in biological and biomedical innovations. Students will explore the principles and regulations governing the protection of intellectual property, especially in the fields of biotechnology, pharmaceuticals, and healthcare, while also considering the ethical implications of these advancements.					
<b>Semester</b>	7	Credits			4	Total Hours
<b>Course Details</b>	Learning Approach	Lecture	Tutorial	Practical	Others	
		4	0	0	0	60
<b>Pre-requisites, if any</b>	Nil					

### COURSE OUTCOMES (CO)

Module	Units	Course description	Hrs	CO No
<b>1. Introduction to Intellectual Property Rights</b>	1.1	Meaning of property, Origin, Nature, Meaning and characteristics of Intellectual Property Rights; Types of Intellectual Property	4	1
	1.2	Property Rights: Paris Convention, 1883, WIPO Convention, 1967, the Patent Co-operation Treaty, 1970, the TRIPS Agreement, 1994	5	1
	1.3	IPR in India: Genesis and development – IPR in abroad - Major International Instruments concerning Intellectual, IPR infringement	6	1

<b>2. Patents in Biotechnology</b>	2.1	Elements of Patentability: novelty, non-obviousness; Understand the patent application process, criteria for patentability inventions. Types of patents; patentable and non-patentable subjectmatter	5	2
	2.2	Registration procedure, rights and duties of patentee, assignment and license, restoration of lapsed patents, surrender and revocation of patents	5	2
	2.3	Infringement, remedies & penalties; patentable protection in biotechnology, challenges in biotech patenting	5	2
<b>3. Bioethics, Biosafety and Translational Research</b>	3.1	Definition, historic evolution, codes and guidelines	4	3
	3.2	Bioethical issues- bio-safety environmental impacts Ethical challenges related to access to medicines and the role of intellectual property rights in drug development.	3	3
	3.3	Ethics related to research on human subjects and animal samples Ecological ethics.	3	3
	3.4	Understanding of biosafety principles and their significance in the context of translational research	4	4
	3.5	Concept of biosafety levels and their application in different laboratory settings.	3	5
	3.6	Biosafety implications of emerging technologies in translational research	3	5
<b>4. Field Visit</b>	4.1	Intellectual Property Offices	5	6
	4.2	Biotechnology and Pharmaceutical Companies	5	6
<b>5. Teacher specific content/ Teacher facilitated activities</b>				

<b>Teaching And Learning Approach</b>	<b>Classroom Procedure (Mode of transaction)</b> Direct Instruction: Brainstorming lecture, E-learning Interactive Session: Group Assignments, Library work and Group discussion, Presentation by individual student, field visit
<b>Assessment Types</b>	<b>MODE OF ASSESSMENT</b> <b>A. Continuous Comprehensive Assessment (CCA) (30 marks)</b> MCQ test for half an hour Seminar presentation Viva Report of the field visit

<b>B. End Semester Examination</b> Written examination for two hours (70 marks) MCQ(20 OUT OF 20)20X1=20 Marks Short Answer Questions(6 out of 9)6x5=30 Marks Essay (2 out of 3)2x10=20 Marks
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### References

1. Fleming, D. O., & Hunt, D. L. (2006). Biological Safety: Principles and Practices.(4thEdition).ASM.
2. Parashar, S., & Goel, D. (2013). IPR, Biosafety and Bioethics. Pearson India.
3. Sree Krishna, V. (2007). Bioethics and Biosafety in Biotechnology. New AgeInternational (P)Ltd., Publishers, New Delhi – 110002, India.
4. Sell, S. K. (2000). Private Power, Public Law: The Globalization of Intellectual PropertyRights. Cambridge University Press.

### Suggested Readings

1. Poltorak, A. I., & Lerner, P. J. (2011). Essentials of Intellectual Property: Law, Economics and Strategy (2<sup>nd</sup> edition) Willey

