

**ST JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS)
VISAKHAPATNAM**

DEPARTMENT OF BIOCHEMISTRY

The Department of Biochemistry, St. Joseph's College for Women (A) seeks to serve BSc Programme students interested in careers related to Biochemical reactions in Living Organisms. The department offers Biochemistry in combinations with Chemistry and Biotechnology of BSc. programme. In order to cater to the diverse interests of students and employers, a total of 11 theory and 10 practical courses are offered as part of Biochemistry domain in all the combinations.

Programme Specific Outcomes of BSc Programme with Bio Chemistry

PSOs : Students after graduating with Biochemistry as one of the core subjects will:

PSO 1: Be able to demonstrate basic knowledge in the core areas of Biochemistry (Human Physiology, Bio molecules, and Intermediary Metabolism Immunology etc).

PSO 2: Provide hands on experience in Qualitative and Quantitative analysis of Biomolecules and different types of assay methods

PSO 3: Enhance the ability among the students to do project and write the research papers

PSO 4: Be able to apply knowledge gained in biochemistry to environmental issues.

Assessment Methodology

PSO 1: Be able to demonstrate basic knowledge in the core areas of Biochemistry (Human Physiology, Bio molecules, and Intermediary Metabolism Immunology etc).

Direct method of computing PSO 1 attainment is based on the student performance in all assessment instruments namely online and offline - subjective and objective tests for all the courses offered (BCH 1803(3), BCH 1850(2), BCH 2801(3), BCH 3801(3), BCH 4801(3), BCH 5801(3), BCH 5802(3), BCH 6803(3), BCHA1 6801 BCHA2 6801 BCH A3 6801).

These exams test students learning at knowledge, understanding and application levels in the respective courses. Indirect method of computing PSOs is done through students course exit survey wherein a structured questionnaire is administered to the students and their response is solicited on a 5 point scale. Responses are consolidated and students' satisfaction level with reference to course transaction is computed.

Level of attainment measurement

Level of attainment of course outcomes includes both direct and indirect assessments. Direct assessment is done by testing the knowledge and/or skills of the student in that course by conducting standardized examinations. In indirect assessment we use the student feedback on course which is measured on 5 point scale. The sum of these two assessments is shown as the level of attainment of that course.

Assessment of all the theory courses is done in two parts, namely by formative assessment (40%) which is internal and summative assessment (60%) which is external. The evaluation of 100% of the assessment in each semester is distributed as follows:

Mid Semester Examination 1	15% (which is offline)	Mid Semester Examination 2	15% (which is online)
Accessory Assessment	5% (written quiz, Assignment etc.)		
Attendance	5% (above 75% attendance will be rewarded)		
End semester examination	60% (which is descriptive)		

Level of attainment in all the theory courses offered by the department: ---- 82%

PSO 2 Provide hands on experience in Qualitative and Quantitative analysis of Biomolecules and different types of assay methods

Attainment of PSO 2 is ascertained through the practical courses (BCH 1851(2), BCH 2851(2), BCH 3851(2), BCH 4851(2), BCH 5851(2), BCH 5852(2), BCH 6851(2), BCHA1 6851, BCHA2 6852, BCH A3 6853). They are assessed by conducting formative and summative tests.

Assessment of all the practical courses: Assessments are done by conducting Mid practical exam and end semester practical theory exam. 40% of the syllabus was given in mid semester exam whereas 100% of the syllabus for end semester to test the knowledge of the students.

Level of attainment in all the practical courses offered by the Department: - 92%

PSO 3: Enhance the ability among the students to do project and write the research papers

Attainment of PSO 3 is ascertained through the practical course BCH 5851 or BCH 5852 .

This project work provides an opportunity for the student to apply knowledge and skills obtained in Biochemistry theory and practical coursework. Topics provided by the company, Students choose one topic for study, based on their own interest . Like minded students form teams of 2 to 5 members . The study is followed by collective report submission and individual oral presentation. Attainment of this learning outcome is ensured and assessed by the concerned faculty member at every stage through direct as well as indirect guidance and monitoring.

Assessment of Project work: Project work is assessed as one of the experiments in the practical course BCH 5851 or BCH5852 by the concerned faculty member through the project report, Presentation.

Level of attainment in all the projects done by the students: 99%

PSO 4: Be able to apply knowledge gained in biochemistry to environmental issues.

Assessment of this learning outcome is largely done through the undergraduate general education course namely Environmental Science. This course provides an opportunity for the students to apply knowledge to find the solutions to environmental problems. Direct method of computing PSO 4 attainment is based on the student performance in all assessment namely formative and summative tests in courses on environment as well as a report on the study on environment issues. Average percentage of level of attainments of this course is given below.

Assessment of Environmental Science: The evaluation of 100% of the assessment in environmental science is distributed as follows:

Continuous assessment involving field study, written test, presentation of project findings etc.
30% Participation & Involvement in the course 10% (above 75% attendance will be rewarded)

End semester examination 60% (which is descriptive)

Level of attainment of PSO4 (Environmental science offered by the college): 88.5%

Course outcomes of all the courses offered by Department of Biochemistry.

Code	Title of the paper	Outcomes
BCH1801(3)	Human Physiology	<p>CO1: Inculcate knowledge on the normal functions of all the organ systems, their regulatory mechanisms and interactions of the various systems for well coordinated total body function.</p> <p>CO2: Understand the relative contribution of each organ system in the maintenance of the milieu of interior(homeostasis).</p> <p>CO3: Correlate knowledge of physiology of human reproductive system to Biochemistry</p> <p>CO4: categorizes nervous system and recognizes the cells of nervous system</p> <p>CO5: explain how the activities of organs are integrated for maximum efficiency</p> <p>CO6: Tell the properties of circulatory system and respiratory system</p> <p>CO7: Explain how the muscle contraction involved in movement</p> <p>CO8: The student will demonstrate the role of the hormones in maintaining body function</p> <p>CO9: Explain the properties of digestive system and excretory system</p> <p>CO10: Explain how RBC participate in transport of gases</p>
Level of attainment of CO1 to CO10: - 72%		
BCH1851(2)	Human Physiology Practical	<p>CO1: To develop the skills in techniques of assessing various blood parameters</p> <p>CO2: Acquire skills necessary for qualitative analysis of Blood groups in blood.</p> <p>CO3: Carry out qualitative tests of Saliva.</p> <p>CO4: Skilling in recording temperature, pulse rate and Blood pressure.</p>
Level of attainment of CO1 to CO4: 91.7%		

BCH2801(3)	Biomolecules-1	<p>CO1: Understand the basic structures, Physico, Chemical properties of Biomolecules such as Carbohydrates and Lipids.</p> <p>CO2: Able to understand classification of Biomolecules Carbohydrates and Lipids</p> <p>CO3: Enhance the capability of identify the reactions of various functional group of Biomolecules such as Carbohydrates and Lipid</p> <p>CO4: Students will apply the theory based tools to solve simple Biochemical problems.</p> <p>CO5:Recognize lipid structure including lipids found in cell membrane and the transport across membranes</p> <p>CO6:Identify the structure of several monosaccharides disaccharides and polysaccharides</p> <p>CO7:Identify the structure of fat,phospholipids,cholesterol</p> <p>CO8:Differentiate between monomers and polymers</p> <p>CO9: Identify the structural difference between saturated monounsaturated,polyunsaturated fatty acids</p> <p>CO10:Compare and contrast the structure and functions of the oligosaccharides and polysaccharides</p>
Level of attainment of CO1 to CO10: 74.3%		
BCH 2851 (2)	Biomolecules-I Practical	<p>CO1: Able to Interpret Experimental / Investigative data</p> <p>CO2: Distinguish between normal and abnormal data derived as a result of tests which has performed and observed in the Laboratory</p> <p>CO3: Apply theory based tools to solve simple biochemical problems related to subject areas</p> <p>CO4: Identify the unknown carbohydrate in solution</p>
Level of attainment of CO1 to CO4:93.7%		

BCH 3801 (3)	Biomolecules- II	<p>CO1: Able to explain classification of Proteins based on solubility shape and Nucleic acids and their behaviour in solution with respect to salt</p> <p>CO2:State the central dogma of molecular biology CO3: Enhance the capability of identify the reactions of various functional group of Bio molecules such as Proteins and Nucleic acids</p> <p>CO4: Students will apply the theory based tools to solve simple Biochemical problems.</p> <p>CO5:Describe and recognize amino acid structure describe their physical ,chemical properties & predict how their ionic changes change with PH</p> <p>CO6:Describe primary secondary tertiary structure in proteins and identify the types Of interactions important in each case</p> <p>CO7:Describe and recognize the structure of nucleic acids compare and contrast -DNA and RNA</p> <p>CO8:Explain the peptide bond formation and classes of amino acid</p> <p>CO9:summarize the function of different proteins</p> <p>CO10:Recognize the importance of 3 dimensional shape of a protein on its function and the role of bonds in maintaining the shape of a protein</p>
Level of attainment of CO1 to CO10: 82.7%		
BCH 3851(2)	Biomolecules-II Practical	<p>CO1: Develop the skill set in Estimation of Proteins and Nucleic acids</p> <p>CO2: capable of identifying the amino acid present in solution</p> <p>CO3: Capable in separation of Biomolecules</p> <p>CO4:Record analyse and interpret experimental data</p>
Level of attainment of CO1 to CO4: 94.2%		

BCH 4801(3)	Enzymology	<p>CO1:The ability in classifying Enzymes</p> <p>CO2: Understand the mechanism of catalysis employed by the most well characterized enzymes</p> <p>CO3: Identify the methods of enzyme purification</p> <p>CO4: Apply the knowledge of immobilized systems and application of enzymes to Industrial and clinical processes</p> <p>CO5:Describe the chemical nature of enzymes and their functions in biochemical reactions</p> <p>CO6:Explain how the enzyme activity is regulated and affected by temperature ,PH and concentration</p> <p>CO7:Explain enzyme function with reference to the lock and key ,induced fit models</p> <p>CO8:Explain the roles of enzymes inhibitors activators and coenzymes</p> <p>CO9:Recognize enzyme specificity,allosteric enzymes,km</p> <p>CO10:Express the important coenzymes and the groups they transfer</p>
Level of attainment of CO1 to CO10:78.5%		
BCH 4851 (2)	Enzymology Practical II	<p>CO1: Able to assay of different types of Enzymes</p> <p>CO2: Capable in Determine the activity ofenzymes at different temperature PH</p> <p>CO3: Useful to perform the Industrial Applications and able to design new research methods in the area of Enzymology</p> <p>CO4: Use enzyme kinetics to evaluate enzyme activities and their regulation</p>
Level of attainment of CO1 to CO4:88.9%		

BCH 5801 (3)	Intermediary Metabolism-I	<p>CO1: Understand how the Biomolecules are utilized in the body</p> <p>CO2: Define the major pathways of intermediary metabolism of bio molecules, carbohydrates and lipids</p> <p>CO3: Explain how disruptions in intermediary metabolism may lead to disease and illustrate with selected examples</p> <p>CO4: Understand the general pathophysiology underlying the inborn errors of metabolism</p> <p>CO5: Understand the genetic inheritance of inborn errors of metabolism</p> <p>CO6: Describe what happens during carbohydrate digestion glycolysis, glycogenesis, glycogenolysis</p> <p>CO7: Describe what happens in fatty acid oxidation and synthesis as well as in ketogenesis</p> <p>CO8: Explain and give examples of the strategies of metabolism, emphasizing role of ATP coupled reaction</p> <p>CO9: Describe what happens in citric acid cycle, ETC, oxidative phosphorylation and explain the role of each process in energy production</p> <p>CO10: Define catabolism , anabolism and which type of reactions involved</p>
Level of attainment of CO1 to CO10:80%		
BCH 5851(2)	Intemediary Metabolism-I Practical	<p>CO1: Hands on experience in Estimation of the Pyruvate, Alcohol, Glucose and Cholesterol.</p> <p>CO2: Able to apply in Industries and Research Organizations</p> <p>CO3: Hands on experience in Estimation of the Phosphorous</p> <p>CO4: Hands on experience in Estimation of Cholesterol.</p>
Level of attainment of CO1 to CO4:91.6%		

BCH 5802 (3)	Intermediary Metabolism II	<p>CO1: Understand how the Bio molecules are utilized in the body</p> <p>CO2: Explain what happens during digestion of proteins catabolism of amino acids</p> <p>CO3: List the essential , non essential amino acids, role of essential fatty acids</p> <p>CO4: Describe the general strategies for amino acid degradation</p> <p>CO5: Describe what happens in transamination oxidative deamination urea cycle</p> <p>CO6: Describe synthesis of purine and pyrimidine nucleotides</p> <p>CO7: Explain how disruptions in amino acid and nucleotide metabolism may lead to disease and illustrate with selected examples</p> <p>CO8: Understand the genetic inheritance of inborn errors of amino acid and nucleotide porphyrin metabolism</p> <p>CO9: Explain the energy requirements for various individuals and determine the calorific value of different bio molecules like proteins fats carbohydrates</p> <p>CO10: Identify the individuals suffering from protein energy malnutrition</p>
Level of attainment of CO1 to CO10:79.4%		
BCH 5851(2)	Intermediary Metabolism-II Practical	<p>CO1: Skilled in Estimation of Urea, Uric acid, Ascorbic acid</p> <p>CO2: Isolate casein from milk</p> <p>CO3: Estimate the calcium in milk</p> <p>CO4: Calculate Iodine number of oil</p>
Level of attainment of CO1 to CO4: 94.3%		

BCH-E1- 6803(3)	Immunology &Clinical Biochemistry	<p>CO1: Provide to define and understand the scope of clinical biochemistry in diagnosis.</p> <p>CO2: Provide to Apply theory based tools to chemical analysis of biological fluids.</p> <p>CO3: Identify whether the organs -kidney, liver, gastrointestinal tract functioning properly. CO4: Display knowledge of antigen, formation of antibodies, antigen-antibody reaction.</p> <p>CO5:Differentiate between innate and adaptive immunity and explain the main and Defense lines as well as biological barriers to infection</p> <p>CO6: Explain different disorders related to carbohydrate lipid and haemoglobin</p> <p>CO7:Illustrate the cell types and organs involved in the process of immune response</p> <p>CO8:Emphasize and describe antigens immunogens antibodies as well as interaction between them</p> <p>CO9:Illustrate the adverse effects of the immune system including allergy and hypersensitivity</p> <p>CO10:Interpret the important immunological disorders and principles of autoimmunity & Explain vaccination and its role in protection against disease</p>
Level of attainment of CO1 to CO10: 84.3%		
BCH-E1-6851(2)	Immunology &Clinical Biochemistry Practical	<p>CO1: Conduct experiments designed for study of nutritional /environmental biochemistry</p> <p>CO2: Interpret experimental/Investigative data and distinguish between normal and abnormal data derived as a result of test performed and observed in the laboratory</p> <p>CO3: Apply theory based tools to solve simple biochemical problems related to subject areas.</p> <p>CO4: Work in a laboratory with selected experimental techniques and methods which are applied in biochemical</p>

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Level of attainment of CO1 to CO4: 94%

BCH A1 6801(3)	Introduction to food technology	<p>CO1: Describe the composition of cereals & gelatinization of starch</p> <p>CO2: Knowledge on the process of malting</p> <p>CO3: Identify different toxic constituents and able to detoxify the pulses</p> <p>CO4: Explain parboiling of rice and their advantages and disadvantages</p> <p>CO5: Explain the steps involved in refining of oil</p> <p>CO6: Knowledge of different forms of fat and oil</p> <p>CO7: Describe the post harvest changes in fruits and vegetables</p> <p>CO8: Differentiate between broilers and layers</p> <p>CO9: Identify the fresh fish , fresh egg and post mortem changes in meat</p> <p>CO10: Knowledge of different milk products and explain different steps in processing of milk</p>
Level of attainment of CO1 to CO10: 85%		
BCH-A1-6851(2)	Introduction to food technology Practical	<p>CO1: Select appropriate techniques to solve specific problems in food analysis</p> <p>CO2: Identify the adulterants in different types of foods</p> <p>CO3: Basic idea about the shelf life of food</p> <p>CO4: Knowledge on pasteurisation of food</p>
Level of attainment of CO1 to CO4: 94.1%		

BCH-A2-6801(3)	Food processing and engineering	<p>CO1:Applies appropriate drying methods for food</p> <p>CO2:Accounts for changes to the properties of food which occur during food processing, preparation and storage</p> <p>CO3:Utilize the ionic radiations for killing of microorganisms in food</p> <p>CO4:Describe the changes in properties of during food dehydration</p> <p>CO5:Explain the properties of various packaging material</p> <p>CO6:Describe the requirements during the refrigeration storage of food</p> <p>CO7:Explain the changes in properties during freezing of food</p> <p>CO8:Explain the factors which affect the freezing rate</p> <p>CO9:Applies appropriate freezing methods based on the type of food</p> <p>CO10:Describe different separation processes of food & applies different thermal processes for food</p>
Level of attainment of CO1 to CO10:90%		
BCH-A2-6851(2)	Food processing and engineering Practical	<p>CO1:Select appropriate techniques to solve specific problems in food processing</p> <p>CO2:Knowledge on canning of food</p> <p>CO3:Basic idea about the osmotic dehydration of foods</p> <p>CO4:Knowledge on minimal processing of foods</p>
Level of attainment of CO1 to CO4: 81%		

BCH-A3-6801(3)	Food safety and quality management	<p>CO1: Appreciate the roles and perspectives of industry, government and consumers as stakeholders in food safety issues;</p> <p>CO2: Identify and describe biological and chemical hazards in foods;</p> <p>CO3: Describe conventional and non-conventional means of controlling hazards in foods;</p> <p>CO4: Understand Hazard Analysis Critical Control Point (HACCP) as an important quality management system;</p> <p>CO5: Describe the general principles of the epidemiology, pathogenesis, detection, and risk assessment of food-borne organisms;</p> <p>CO6: Gain a general overview of the international bodies involved in global standards for food safety and trade.</p> <p>CO7: Demonstrates hygienic understanding and handling of food to ensure a skills related to food safe and appealing product hygiene, safety and the provision of quality food</p> <p>CO8: Knowledge on antioxidants and mechanism of its action</p> <p>CO9: Explain classification of sweeteners and colors</p> <p>CO10: Describe the different type antimicrobial agents</p>
Level of attainment of CO1 to CO10: 97%		
BCH-A3-6851(2)	Food safety and quality management practical	<p>CO1: Correctly use appropriate laboratory techniques to enumerate isolate and identify microorganisms in food</p> <p>CO2: Estimate the benzoic acid in foods</p> <p>CO3: Identify the microorganisms in water</p> <p>CO4: Knowledge on biochemical tests for identification of</p>

		microorganism
Level of attainment of CO1 to CO4:92%		