

Programme Outcomes of Certificate Courses:

Bajaj College of Science (BCS) offers Bachelor of Science (B.Sc.), Master of Science (M.Sc.) and Doctor of Philosophy (Ph.D.) in two science subjects mainly Chemistry and Botany and certificate courses (CCs). The certificate course at BCS is a comprehensive, interdisciplinary add-on academic program that builds on existing strength of two Departments namely Botany and Microbiology. The certificate courses that integrate applied aspects of botany, statistics and microbiology through practical experiences within academic program. These courses actively utilize guest lectures and mentoring experiences and help students to build self-entrepreneurs and job opportunities.

Programme outcomes (POs) of Certificate Courses will be prepared to:

- Demonstrate know-how for various products of herbal products, vermicompost technology, work flow of clinical labs and work flow of data analysis.
- Practice professional ethics in conduct of science.
- Develop problem-solving and analytical skills.
- Able to operate and interpret the data from instrumentation.
- Demonstrate an ability to understand career opportunities in science and technology industries.

Programme Specific outcomes (PSOs) of Certificate Courses will be prepared to

- Demonstrate a working understanding of the pathogenesis of a variety of common and uncommon diseases.
- Interpret appropriate microbiology laboratory tests, including gram stain, culture and sensitivity, and serologic tests, for the proper diagnosis and effective treatment of patients with infectious diseases.
- Design data collection plans and basic tools of descriptive statistics.
- Understand the concept of sampling distribution of a statistic and its properties, difference between parameter and statistic.
- Utilise statistical knowledge to able to get into profession of data analysis in different sectors.
- Demonstrate a working understanding of herbal preparation and products.
- Design novel ways of formulations for herbal cosmetics
- Design the process and develop vermicompost technology and their products.

- Understand large-scale development of vermicompost technology and factors affecting large-scale production of vermicompost.

Sr. No.	Subject / Course Name	Coding pattern
1	Clinical Laboratory Techniques	CC (1) – CLT

Certificate Course in Clinical Laboratory Techniques

Introduction: To impart crucial job skills to the students an add-on-Course Clinical Laboratory Technology which is 'Need Based' and 'career-oriented course' is run by Dept. of Microbiology, Bajaj College of Science, Wardha. The complete syllabus is of 20 credits including at least eight days training programme at well recognized pathology laboratory.

Goals and Objectives:

To opt skill-oriented add-on courses by students as a parallel sub-discipline course while pursuing their degree level education

To update the knowledge and skills of students in clinical and pathological study.

Student Strength:20

Duration of Course: One Academic year

Credit based Course/Non-credit based Course:20 credit

Course Outcomes:

CO1: Students will learn about:

1) Bacteriology (Classification, Cultivation, isolation and identification & Pathogenicity of Medically important bacteria, Preservation of stock cultures).

2) Media (Different methods of sterilization of media and its preparation).

CO2: Students will learn about different Staining Techniques (Simple staining, Differential staining, Negative staining, spore staining, Capsular staining, Flagellar staining).

CO3: Students will learn about

1) Immunology (Antigen, Antibodies Antigen –antibody Reactions and Hypersensitivity)

CO4: Students will learn about

1. Elementary knowledge of handling, maintenance & care of analytical instruments (Weighing Balance, Centrifuge, pH Antinibodies Antigen Cyler, Electrophoresis).
- 2) Clinical Biochemistry (Proteins, Lipids & Carbohydrates)

3) Human physiology (Structure, location & distribution of different parts of human body)

CO5: Students will learn about:

1) Haematology

2) Clinical Pathology (Collection of blood, stool, urine, cerebrospinal fluid, pus, Sick cell preparation, Osmotic fragility test).

Internship of at least 8 days at well recognised Pathology

Sr. No.	Subject / Course Name	Coding pattern
2	Herb & Herbal Product	CC (2) – HHP

Certificate Course in Herbs and Herbal Products

Introduction:

Herbal products are medicines derived from plants. They are used as supplements to improve health and wellbeing, and may be used for other therapeutic purposes. Herbal products are available as tablets, capsules, powders, extracts, teas and so on. Herbal medicines are thought to be safe as it is natural, but in fact it can cause serious adverse effects and interaction with other drugs and supplements. The Certificate course in Herbs and Herbal Products is meant to acquaint the students about the importance of herbs and herbal products and to train them for the preparation of herbal products.

Student Strength: Minimum 20

Duration of Course: 1 month

Credit based Course/Non-credit based Course: Non-Credit based Course

Course Outcomes:

By successfully completing this course, students will be able to:

CO1: Describe the history of herbs.

CO2: Identify, describe, and evaluate various uses for culinary herbs and medicinal herbs.

CO3: Know the basic techniques for growing your own herbs.

CO4: Know the techniques involved in harvesting and drying herbs, and

CO5: Demonstrate mastery of preparation of various herbal products.

Sr. No.	Subject / Course Name	Coding pattern
3	Statistical Analysis Using R	CC (3) – R

Certificate Course in Statistical analysis using R

About the Course: Why to get acquainted with R for statistical analysis?

At early career, undergraduate and postgraduate students, PhD scholars and young faculties are in overwhelming situation once they acquire the experimental and observation-based data. Undergraduate and postgraduate students for project work as well as research scholars for PhD are at a critical stage of analysing data.

Through an interactive course on statistical data analysis, Bajaj College of Science is committed to bridge this curriculum gap with self-learning skill sets with help of open-source R statistical software and facilitate the scholars to analyse their data in different disciplines such as Chemical Sciences, Life Sciences, Pharmaceutical Sciences and the related fields. The aim of the course is to provide a comprehensive understanding of basic statistical concepts and to give hands-on experience in applying R statistical software.

Participant's Takeaway from the Course

At the end of the course the participants will: -

Increase broader understanding of what, when and how to use different statistical techniques

Gain adequate expertise in handling R software

Exposed to various research data in different fields of scientific research

Able to perform data analysis independently using R

Course Content

Data entry, structure of dataset, Data and variable transformations, Decision to select parametric and nonparametric test, Student's t test, ANOVA, Regression, Correlation

For whom

The program is exclusively designed for undergraduate and postgraduate students, research scholars and academicians (college teachers, University faculty) who are actively engaged in teaching and research.

The program is so designed to keep it jargon free. The mathematics pre-requisite will be taught during the course.

Time and Venue

2.30 pm- 5.00pm @ICT Centre, Bajaj College of Science, Civil Lines, Wardha-442001

Pre-requisites for Enrolment:

Ability to operate Computer-Windows and MS office package

Self-motivation to learn through action learning and practice.

Preferable –Laptop with Windows 7 and MS-Office.

Learning and Evaluation Process:

Learning modules will be carried out with help of white-board teaching and ppt presentations with numerous examples. Hands on practicals will be carried out with all participants with available data sets.

Evaluation will be carried out with assignments for various modules. Project based learning will be encouraged with data acquired from participants.

Student Strength: Minimum 20

Duration of Course: 2-3 months (30 credit)

Credit based Course/Non-credit based Course: Non-Credit based Course

Course Outcomes:

By successfully completing this course, students will be able to:

CO1: motivate and create enthusiasm for learning a programming language

CO2: Access and utilise online resources (blog, YouTube, archives, GitHub and useful websites) for R and import new function packages into the R workspace.

CO3: Import, manipulate, subset and summarize data-sets in R.

CO4: Explore data-sets to create testable hypotheses, normalise data and identify appropriate statistical tests and prepare output of statistical test in table and text form.

CO5: Create and edit visualizations (Figures and Tables) with R.

Sr. No.	Subject/Course Name	Coding Pattern
4	Vermicompost Technology	CC(4)-VT

Certificate course in Vermicompost Technology

Earthworms have been on this planet over 20 million years. It is well known that earthworms are nature's way of recycling organic nutrients. From the ancient times, earthworms are used to recycle organic wastes and production of manure. Earthworms are able in converting decomposing food and other organic wastes into nutrient-rich fertilizer which are inexpensive, energy efficient and free of harmful chemicals. In the present time, looking at the growing need of waste management and the need of organic bio fertilizer in agriculture industry, vermicomposting technology is the need of the hour. Vermicomposting can be considered a faster, environment friendly method in recycling of organic waste materials simultaneously producing a superior quality of manure. Vermicomposting is not only useful in recycling of food wastes but can be utilized in recycling cardboard and paper as well as agriculture waste, manures and biosolids which may be an environmental hazard.

As Wardha district is the agriculture based district vermicompost is having good demand from the farmers as well as by the homemakers for gardens and kitchen garden. In this course a knowledge on theory as well as practical applications on Vermicompost Technology will be provided to the participants.

Specifications of the course

A) Nature	Certificate course
B) Duration	30 hrs
C) Number of students to be admitted	15 to 20
D) Fee proposed	Rs. 200/-
E) Eligibility	10+2 (Open to all)

Course outcomes:

After successfully completing this course, students will have the knowledge of

CO1: Definition of Vermiculture, its history and economic importance; Biological transformation of organic wastes for generating biofertilizers.

CO2: Useful species of earthworms, Local and exotic species of earthworm, Key to identify species of earthworm ; *Eisenia fetida* : Identification, Taxonomy, Anatomy, Life cycle and vital cycle; *Eudrilus eugeniae* : Identification, Taxonomy, Anatomy, Life cycle and vital cycle.

CO3: Earthworm farming, harvesting, vermicomposting harvest and processing; Small scale and commercial scale of earthworm farming and vermicomposting; Vermiwash collection and uses; Packaging and marketing of vermicompost and vermiwash.

In the practical part participants will have hands on experience and knowledge of

CO4: Identification of earthworms and handling of earthworms; Study of External characters of *Eisenia fetida* and *Eudrilus eugeniae*; Study of life cycles of *Eisenia fetida* and *Eudrilus eugeniae*; Rearing of Earthworms.

CO5: Study of Instruments and devices used in Vermiculture and vermicompost; Preparation and maintenance of vermibeds; Harvesting of vermicompost; Drying and storage of vermicompost; Packaging of vermicompost.

CO6: Study of soil and compost texture; Biochemical analysis of soil; Biochemical analysis of vermicompost; Biochemical analysis of vermiwash.