

INDIRA GANDHI NATIONAL OPEN UNIVERSITY

Learning Outcomes Curriculum Framework Document

2019

CENTRE FOR INTERNAL QUALITY ASSURANCE (CIQA) &
STAFF TRAINING AND RESEARCH INSTITUTE OF DISTANCE
EDUCATION (STRIDE)

PREFACE

The Indira Gandhi National Open University is a pioneer institution that has contributed significantly to the Higher Education system of the country by providing equitable access to quality education through the Open Distance Learning mode. It has continuously striven to build a knowledge society by providing inclusive and lifelong education to more than three million learners across the country and overseas.

Keeping pace with the emerging ethos of institutionalizing an outcome-oriented higher education system and enhancing employability of graduates, it has adopted the UGC notified Scheme for development of **Learning Outcomes-based Curriculum Framework (LOCF)** in the 72nd meeting of the Academic Council held on 30th April 2019. Such initiatives are required for upgrading academic resources and learning environment, raising the quality of teaching and research across all programmes offered by the University. This is critical for enabling effective participation of the IGNOU learners in knowledge production and contribution to the knowledge economy, by equipping the learners with skills relevant for global and national standards.

The Centre for Internal Quality Assurance (CIQA) and Staff Training and Research Institute of Distance Education (STRIDE) have been working together for developing documents on Learning Outcomes. A Faculty Development Programme (FDP) on Learning Outcomes based Curriculum Framework was organized from 24th -30th September 2019. The outcomes of this FDP was the finalization of the template for developing the LOCF document for the Degree, Diploma and Certificate Programmes offered by IGNOU and initiation of the process of learning outcomes-based approach to curriculum planning and development, by revisiting the existing programmes and while developing any new programme. Subsequently seven programmes were prepared which are presented in this LOCF document.

We take this opportunity to thank Prof. Nageshwar Rao, Hon'ble Vice Chancellor IGNOU for his constant encouragement to our programmes. We also thank Prof. Rampelli Satyanarayana, Director, STRIDE for his support. We express our gratitude towards the Programme Coordinators of the seven programmes whose LOCF has been included in this document, as well as towards the resource persons and participants of the LOCF workshop. This draft LOCF document is an initial effort and we hope that more programmes will be added to this document. We look forward to feedback for further improvement of this document.

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MASTER'S DEGREE PROGRAMMES

1. MASTER OF ARTS IN DISTANCE EDUCATION PROGRAMME (MADE)

Dr.Anita Priyadarshini (Programme Coordinator, MADE)
STRIDE

1. Introduction

Open and Distance Learning (ODL) system is accepted across the globe as a system that is able to fulfill the educational needs and aspirations of larger population of learners both at university and school level. The inherent flexibility of the system is able to attract learners who are truly lifelong learners. These learners are looking for an opportunity to study at different points of time in their lives and the system fulfills this requirement. Distance learning with its use of technology is able to reduce the distance and bring teaching to the doorstep of the learner. It follows a learner-centric approach using teaching learning strategies and models that makes learning dynamic and interactive. The growth of the system at national and international level makes it a system which engages large numbers of teachers and other support staff and provided opportunities for employment. There is therefore a need for specialized training for those who need employment as well as those who are already employed in the system.

The Master of Arts in Distance Education (MADE) has been designed to develop human resources in various specialized areas of Distance Education.

2. Nature and Scope

The Master of Arts in Distance Education (MADE) is offered by STRIDE to meet the needs of teachers and professionals in the area of distance education. Today India has a National Open University as well as several State Open Universities that are offering programmes through the ODL mode. In addition to this, there are many Directorates of Distance Education that are a part of conventional universities. India also has a large number of Open Schools that are catering to pre-degree level learners offering general education, vocational education and lifelong learning programmes. The government has always had high expectations from the ODL system as it is seen as a viable means for providing education to the unreached. The philosophy and nature of the ODL system has created a need to train those who are seeking employment in this system as well as those who desire to be lifelong learners. The MADE programme is a means for meeting this need of teachers, staff and learners of the ODL system. The programme includes key areas of study such as philosophy of distance education, its historical development, instructional design, technology, management, training, management, research, economic dimensions and support services of distance education.

The MADE is an integrated programme of two years duration. There is a provision by which in case learners desire to exit the programme after successfully completing the first year of the programme, then they are awarded the Post Graduate Diploma in Distance Education

(PGDDE). There is also a provision for such successful PGDDE learners to re-enter the programme, after a gap, through a direct lateral entry into the second year. The programme has a total of 60 credits offered through ten courses. The courses are supported with academic counseling, technology support, and project work.

3. Aims of the Programme

The programme aims to promote awareness about the concept and utility of ODL in India and other developing countries and to develop the much-needed human resources for the existing Open Universities, Open Schools and Directorates of Distance Education.

4. Characteristic attributes of a graduate:

- **Disciplinary knowledge and skills:** Comprehensive knowledge and understanding of major concepts, theoretical principles in distance education and other related fields of the study, including broader inter-disciplinary sub fields such as education, research, training, ability to use ICT-technologies in distance education.
- **Skilled communicator:** Ability to transmit information related to distance education.
- **Critical thinker and problem solver:** Ability to employ critical thinking and efficient problem solving skills while designing programmes, and meeting challenges in delivery of distance education.
- **Sense of inquiry:** ability to inquire and question the various existing facets in the field of distance education including challenges and to be able to resolve them through appropriate solutions.
- **Team player/worker:** ability to working effectively in teams, develop a spirit of tolerance and work in harmony for the betterment of distance education practices.
- **Skilled project manager:** Capability of identifying appropriate resources and managing them for design delivery and implementation of distance education.
- **Digitally literate:** Capability of using ICTs in distance education as well as latest technological tools to develop more effective teaching learning practices for learners at a distance.
- **Ethical awareness/reasoning:** Ability to present original, honest and authentic work in thought and practice and refrain from any unethical behavior.
- **Lifelong learners:** Capability of following lifelong and lifewide learning practices as a means for continuous learning and self development.

5. Qualification descriptors:

The qualification descriptors for MADE programme may include the following

- **Demonstrate conceptual awareness, knowledge and understanding of the areas of distance education, its philosophy and growth.**

- Demonstrate knowledge of systemic research and awareness of theories, issues and different perspectives related to distance education
- Demonstrate skills for designing and developing curriculum and instructional material for distance learners.
- Demonstrate skills to identify and use technological applications, ICTs and e-resources for enhancing learning, its management and delivery.
- Demonstrate ability to analyze issues related to economic dimensions of distance education structured in a logical and coherent manner and illustrated with appropriate examples; a Use knowledge to undertake research on different aspects of.
- Demonstrate skills for developing training and professional development programmes for different categories of distance teachers and other staff.
- Demonstrate ability to apply high level of knowledge for undertaking project work in different areas related to distance education.

6. Programme learning outcomes relating to MADE programme

After completing the MADE programme, the learner will be able:

- To explain growth and philosophy of Distance Education.
- To develop different models of instructional design for distance learners.
- To explain the learner support system and services in ODL.
- To plan and design management structures and practices for distance education.
- To analyze economics of distance education in national and international perspective.
- To explain curriculum development process and its transaction in distance education.
- To develop systemic knowledge and undertake research on Distance Education.
- To apply technology for learning enhancement and creation of digital content.
- To plan and develop training programmes for continuous professional development of distance teachers.
- To develop skills to undertake project work in different areas of distance education

7. Course-level learning outcomes:

1. MDE-411: Growth and Philosophy of Distance Education

The objectives of the course are as follows:

- Introducing basic issues of open and distance education;
- Explaining its philosophical foundation;
- Describing growth and present status in terms of international scenario;
- Special emphasis on distance education in South Africa; and
- Collating the growth and innovation in various facets of open and distance education.

2. MDE-412: Instructional Design in practice and developing portfolio.

The objectives of the course are as follows:

- Discuss the concept of learning and instruction and implications of three theories of learning i.e., Behaviouristic School of Thought, Cognitivist School of Thought and Constructivist School of Thought;
- Enumerate different theories and models of instructional design;
- Describe different processes involved in designing instruction for distance learners;
- Explain the instructional design practices in classrooms, open and distance learning, training and e-learning; and
- Develop skills in designing portfolio.

3. MDE-413 : Learner Support systems and Services

The objectives of the course are as follows:

- Describe the basic principles and methods of learner support;
- Explain the importance of support services in the ODL system;
- Discuss learner support services as a sub-system of any ODL institution;
- Develop some basic skills like study skills, cognitive skills, problem solving skills, reading and writing skills. For promoting self directed learning;
- Organize academic counselling and other support services; and
- Assess and report the performance and progress of distance learners.

4. MDE-414: Management of Distance Education

The objectives of the course are as follows:

- Describe an overview of management functions and processes with view to understand the organisation and structure of the education systems;
- Discuss status and issues related to higher education with focus on India and other third world countries;
- Explain the origin, history and evolution of distance education with focus on India;
- Examine the planning and management issues related to ODL system;
- Review the distance education practices with the help of a few institutional cases; and
- Describe the theoretical issues involved in management of change in general and distance education in particular.

5. MDE-415 Research of Distance Education

After completing this course the learner should be able:

- To explain the purpose and nature of educational research with special reference to research and distance education;

- To explain the difference research methods;
- To describe the different tools of research;
- To analyse and interpret different types of data; and
- To explain the different methods and statistical packages used for data processing.

6. MDE-416: Curriculum Development for Distance Education

The objectives of the course are as follows:

- Introducing curriculum as a concept, its foundation, its issues and trends in distance education;
- Familiarize the curriculum with its design and development by using an appropriate media and methods;
- Evolving appropriate transaction strategy to provide for better learner support services;
- Evolve and appropriate course evaluation strategy and learner evaluation and its tools and techniques; and
- Expose global curriculum trends in territory, school, technical, vocational, non formal continue education with material production models.

7. MDE-417: Distance Education: Economic Perspective

The objectives of the course are as follows:

- Define economics of education, distinguish between consumption and investment in education, and analyse budgeting and costing in education;
- Describe how distance education contributes to human resource development, and analyse funding, pricing and quality in distance education and online learning;
- Analyse various cost types and functions in distance education and online learning;
- Analyse and present comparative study of costs of distance education across important and mega open universities globally; and
- Describe various cost studies in distance education and online learning, and develop ability to formulate research studies on distance education and online learning.

8. MDE-418: Educational Communication Technologies

The objectives of the course are as follows:

- Critically examine the process of educational communication to plan, design and use appropriate communication technologies in context;
- Identify the range of educational communication technologies, and their relative strengths and weaknesses;
- Use educational communication technologies confidently to create digital content and deliver these through new information technologies;

- Discuss and explain the general trends in the developments and use of educational communication technologies at national and international level; and
- Create engaging, collaborative, reflective and authentic learning environments for delivery of education and training.

9. MDE-419: Staff Training and Development in Distance Education

After completing this course the learner should be able:

- To explain the philosophy and purpose of staff development for distance education;
- To explain the training techniques for teachers, support staff and non-teaching staff of distance education;
- To demonstrate the different methodologies used for staff development;
- Identify different instructional designs for online learning/training; and
- To reflect upon various professional developments, practices in a national and international context.

10. MDE-420: Project Work

After completing this course the learner should be able to:

- Develop research skills, training skills and learning material development.
- Identify solutions for local problems through ‘scientific method’ of investigation; and
- Create new knowledge in the area of Distance Education.

8. Teaching-learning processes

The teaching learning process is a very comprehensive one in which the learner is supported through self-learning materials, which are available in both print and digital versions. Academic support is also provided through Interactive Radio Counseling, Teleconferencing and telephonic support. The STRIDE faculty provides support through counseling, checking of assignments and guiding learners in their project work.

9. Assessment methods

The assessment includes formative and summative evaluation. The learners are provided an opportunity to check their progress within the self learning material itself, as well as through assignments. There is also a project work which is equivalent to one course. There is a Term-end examination which is held two times in a year.

2. MASTER OF ARTS IN ADULT EDUCATION PROGRAMME

Dr. M.V. Lakshmi Reddy (Programme Coordinator, MAAE)
Dr. Elizabeth Kuruvilla (Programme Co-coordinator, MAAE)
School of Education (SOE)

1. Introduction

The learning outcome-based curriculum framework for Master of Arts in Adult Education(MAAE) is intended to provide a comprehensive exposure to the theory, policies, programmes, practical aspects, processes, potentials, issues and challenges of adult education. Education of adults is a multifaceted complex process which encompasses many subjects and interest areas. It encompasses Adult Basic Education (teaching basic learning and survival skills to the non-literate, literate and undereducated); continuing education and enrichment activities for personal and professional growth of the educated. The programme will promote among learners necessary knowledge, understanding, skills, attitudes and competencies that will help them to build their capacity to participate in adult educational activities at different levels.

2. Nature and Scope of Master of Arts in Adult Education Programme

Adult Education, as a discipline is no longer restricted to literacy alone. In a wider connotation, Adult Education refers to any form of learning process that engages mature men and women beyond the limits of a traditional learning environment. It caters to a varied population of adult learners. It includes everything from learning the three basic R's (reading, writing, and arithmetic) to learning for personal accomplishment and goes to the extent of enabling a person to attain a higher academic or professional degree. It is designed for enhancing knowledge and skill development as well as for enhanced career opportunities. Adult Education primarily aims at extending educational options to those adults, who have lost the opportunity and have crossed the age of formal education, but now feel a need for learning of any type, including diverse forms of literacy, basic education, and skill development. This programme provides the scope for learners to enhance the quality of life through lifelong learning.

MAAE programme is a two-year programme structured both as modular and as an independent programme in the sense that after completion of first year, learners are awarded with Post Graduate Diploma in Adult Education (PGDAE). PGDAE is also on offer as an independent programme of one year duration. Further, those who are holders of PGDAE are eligible to enroll directly into second year of MAAE as they get due credit transfer for PGDAE courses, since it is constituted as first year of MAAE. MAAE programme is of 68 credits. One credit amounts to 30 hours of study inclusive of reading self-learning materials, doing practicals, fieldwork, self-assessment questions, submission of assignments, and participation in radio counselling and teleconferencing. This programme consists of 10

courses (five courses in each year)- 8 theory courses (each of 6 credits), one practical course of 10 credits and a dissertation course of 10 credits. Out of 8 theory courses 6 courses are compulsory and 2 are optional / elective. The practical course provides for development of necessary skills, competencies and abilities for working with the individuals, the community and the institutions. This will also enrich the skills of learners in organizing educational, developmental and welfare activities for adults and the communities. The practical work is categorized under the following three broad components:

- Community-based Practical Activities
- Workshop-based Practical Activities
- Adult Education Training Centre/ Institution-based Practical Activities

3. Aims

The overall aims of the master degree programme in adult education are to:

- To develop broad knowledge and understanding of adult education as an area of study;
- To promote professional competency and capacity building of pre-service and in-service people in the field of adult education and allied areas.

4. Characteristic Attributes of a Degree holder in Adult Education

Some of the characteristic attributes of a degree holder in adult education may include the following:

Disciplinary knowledge and skills: Capable of demonstrating: (i) comprehensive knowledge and understanding of adult education, (ii) ability to apply self-reflection skills.

Communication skills: Ability to express the issues faced by neo-literates in a clear and concise manner in writing, orally and other means of communication.

Critical thinker: Ability to critically evaluate the role of governmental and non-governmental organizations in adult skill development programmes.

Commitment to the larger cause: Devotion to promote major interests of adults linked to larger public cause.

Responsible and accountable: Irrespective of the nature and magnitude of consequences, an adult must own the responsibility for all his/her actions, good and/or bad.

Problem solving ability: Apply skills in participatory training and research programmes for creating an educative environment for solving problems.

Sense of inquiry: Capability for asking relevant questions relating to issues and problems in implementation of adult education programmes.

Spirit of team work: Ability to work effectively and respectfully in a team to fulfill diverse needs of adults and their communities.

Digitally literate: Capable of using social networking in global adult learning.

Ethical awareness: Ability to formulate a position related with issues in adult education programme from multiple perspectives.

Self-directed learning: Ability to promote learner autonomy as a distant learner and to identify appropriate resources required for an adult education institution.

Leadership quality: Empowering adult learners to learn and support themselves in their development.

Lifelong learning: Ability to acquire knowledge and skills, including ‘learning how to learn’, that are necessary for participating in learning activities throughout life.

5. Qualification Descriptors

The qualification descriptors for a Master Degree programme in Adult Education may include the following:

- **Demonstrate:** i) a coherent understanding of adult education as an area of study and its linkages with related disciplinary subjects; ii) procedural knowledge that creates different types of professionals related to the subject area of adult education, including research and development.
- Use knowledge about how adults learn and understand the psychology of adults.
- Apply different learning methods, styles and techniques while working with adults.
- Demonstrate competence in dealing with learning needs, problems, motivation and prior experience of adult learners.
- Demonstrate competence in being aware of and taking responsibility for the institutional setting in which adult learning takes place at all levels.
- Equip learners with the academic knowledge, research skills and practical employability skills.

6. Programme Learning Outcomes

The programme learning outcomes are the following:

- To develop in the students the national and international perspectives of various aspects of theory and practice of adult education;

- To upgrade their knowledge and understanding of policies and programmes of adult, continuing and extension education, and development and welfare among others;
- To enhance their understanding and skills of documentation, management and dissemination of knowledge and information on various aspects and processes of adult education;
- To improve their knowledge, understanding, skills and abilities related to organizing and managing an adult learning setup;
- To equip them with the skills of involving the community in participatory planning, development and transaction of curriculum as well as training, evaluation and research processes related to adult education and development;
- To enhance their understanding and skills of networking at local, state, national and international levels for their personal, social, and professional development;
- To enable them to critically analyze, appreciate and promote the role of adult education in the emerging social, political, cultural, economic, developmental and other situations for effecting transformation at the national and international levels.

7. Course Learning Outcomes

Course-level learning outcomes of MAAE programme is indicated below:

Course MAE-001: Understanding Adult Education

This course develops understanding about various concepts, historical developments, foundations, programmes, perspectives, and dimensions of adult education.

Course MAE-002: Policy Planning and Implementation of Adult Education in India

This course describes adult education in Five Year Plan, agencies involved in the implementation of adult education, and emphasizes participatory training and research in adult education.

Course MAE-003: Knowledge Management, Information Dissemination and Networking in Adult Education

This course explains the concepts of data, information, knowledge and wisdom, types knowledge and various aspects, issues and dynamics of knowledge management, information dissemination and networking in adult education.

Course MES-016: Educational Research

This course develops understanding of different perspectives, approaches, types, designs, tools and techniques of Data collection and analysis as well as report writing.

Course MAEL-001: Practical Work Components: Student's Handbook for Practical Work

This course develops necessary skills, competencies and abilities required for an adult educator to work with the individuals and groups, the community and the institutions.

Course MAE-004: Extension Education and Development

This course enables the learner to play an effective role, as an adult educator, in promoting extension education for the developments of adults, the community, the society, and the nation at large.

Course MAE-005: Population and Development Education

This course discusses the relationship between population and development, welfare and standard of living of the individuals, the communities, the nation and the world as well as the policies and programmes aimed at population regulation or control.

Course MAEE-001: Sustainable Development

This course provides an understanding about sustainable development and the policies and programmes related with it, including the global challenges thereof.

Course MESE-061: Open and Distance Learning Systems

This course describes the concept, philosophy and development of open and distance learning, the transactional, delivery and evaluation mechanisms, and current trends and developments at national and international levels.

Course MAEE-002: Basics of Legal Awareness

This course emphasizes on the essentials of Indian legal system, the laws that empower the people, the laws that create liabilities on the individuals, the state and the other entities, the laws that provide special rights to certain categories of people, and the laws that provide for effective remedies when their rights are violated or infringed.

Course MESE-062: Vocational Education

This course illustrates the significance of vocational education for sustainable national development, policy dimensions, current trends, issues, challenges and prospects of vocational education.

8. Teaching-Learning Processes

The teaching-learning process of MAAE programme is designed to encourage the acquisition of disciplinary/subject knowledge and understandings and field experience. The learner is actively engaged in the teaching-learning process. Besides cognitive understandings, the programme also focuses on development of academic and professional skills required to work with adults as individuals, in groups and in community as well as with adult education training institutions. The instructional system follows multi-media approach i.e. self-learning printed material, audio-video programmes, assignments, face-to-face counselling sessions/contact sessions, workshops, teleconferencing and Interactive Radio Counselling. Also, in a workshop mode, the learners are provided with multiple experiences of working individually as well as in collaboration with peer groups, resource persons and experts in the field to meet the specific needs and requirements of the programme.

9. Assessment Methods

The assessment of learners' achievement is aligned with the programme learning outcomes and the academic and professional skills that the programme is designed to develop. The assessment of learning outcomes comprises three aspects such as i) self- evaluation exercises in the form of 'check your progress' inbuilt in each unit of study material which are non-credited, ii) continuous evaluation in the form of periodic compulsory assignments which carries a weightage of 30% for each theory course and term-end examination with a weightage of 70% for each course. The assignments practically enhance learners' understanding as well as articulation and analytical skills. The assessment of students' performance in each of the components of practical course is done on continuous and comprehensive basis. For dissertation course, assessment comprises learners' performance in both the dissertation report and the viva-voce.

POST GRADUATE DIPLOMA PROGRAMMES

3. POST GRADUATE DIPLOMA IN ANALYTICAL CHEMISTRY PROGRAMME (PGDAC)

Prof. Lalita S. Kumar, (Programme Coordinator, PGDAC)
SOS

1. Introduction

The chemists occupy positions in different capacities in industry and national laboratories. The list of industries is very large; a few to name are Fertilizers, Sugar and Confectionery, Food Processing, Paints, Plastics and Polymers, Detergents, Glass and Ceramics, Cement, Dyes and Textiles, Pharmaceuticals, Petroleum Refining & Petrochemicals, Steel and Alloys, etc. Apart from the above, chemists are employed in many national laboratories run by CSIR, ICAR, etc. The programme, "P.G. Diploma in Analytical Chemistry" was designed and developed keeping in view the role of chemists in laboratories and industries and the related horizontal and vertical academic programmes. The programmes could vary from a continuing education type aiming to benefit the chemists employed at different hierarchical levels in multifarious industry and national laboratories to extension education type with awareness level approach or vocational value, thereby benefiting the target audience at the lower strata of the society.

Seen against the demanding situation in which a chemist in an industry finds himself/herself, the training given through B.Sc. or in some cases even through M.Sc. curriculum is quite inadequate. While formulating a continuing education programme like PGDAC, adequate care and attention has been taken with respect to the of varied skill requirements such as practical work, problem tackling, information and quantitative skills, etc. The laboratory courses offered by open and distance learning institutions pose unique challenges for the educator as well as the learner. Three main issues, which need to be addressed while offering distance learning lab courses are, effectiveness, achievement of lab objectives and maintenance of course quality. The distance learning adds another dimension to it, which is delivery strategy.

The programme design was carried out systematically by holding an explorative workshop involving expertise from industry, academic institutions, professional/chartered bodies and Federation of industry. A threadbare discussion led to the broad structure of the PGDAC programme.

This Diploma programme is worth **32 credits** spread over **eight courses**. Out of eight, 4 are theory courses of 6 credits each and 4 laboratory courses of 2 credits each. The medium of instruction is English only. The duration of the programme is one year with a flexibility of completing it in three years time.

2. Nature and Scope of the PGDAC programme

Post Graduate Diploma in Analytical Chemistry (PGDAC) is a continuing education programme designed and developed keeping in view the role of chemists played directly and

indirectly in industry and national laboratories. The subject area of analytical chemistry requires skill based curriculum augmented with sufficient theoretical background. The theory and laboratory principles and procedures of various analytical techniques have been covered in the print materials. Each of the theory courses consists of five blocks covering text worth six credits. The laboratory experiments have been covered in one block containing practical work worth two credits each. A mix of theory and laboratory work enables the learners to get well equipped with the skills required by the employing agencies.

The P G Diploma holders would have a scope to get employed in all the laboratories run by CSIR, ICAR, etc. e.g., NCL, CDRI, CICT, GSI and industries that have a requirement of analytical chemists and involve some type of qualitative and quantitative testing. Besides a scope of employment for the fresher, there is an opportunity for the capacity building of those who are already employed and have not undergone a formal training. The latter can have skill enhancement and can work more efficiently.

3. Aims of the PGDAC programme

The overall aims of PGDAC programme in chemistry are to:

- provide training in modern analytical techniques to the learners
- provide appropriate theoretical background and develop practical skills for analysing materials even in trace amounts using modern analytical methods and instruments
- enable students acquire the analytical data and interpret the same using statistical principles
- inculcate a problem solving approach by coordinating different analytical techniques

4. Characteristic attributes of a graduate in PGDAC programme

Disciplinary knowledge and skills: Capable of demonstrating (i) comprehensive knowledge and understanding of major concepts, theoretical principles and experimental findings in analytical chemistry and applications of various instrumental techniques in various day-to-day functions (ii) ability to use modern instrumentation for chemical analysis and separation.

Skilled communicator: Ability to transmit complex technical information relating to analytical chemistry in a clear and concise manner in writing and oral.

Critical thinker and problem solver: Ability to employ critical thinking and efficient problem solving skills in the areas of analytical chemistry (basic quantitative methods, separation methods, spectroscopy, electro-analytical and other methods).

Sense of inquiry: Capability for asking relevant/appropriate questions relating to issues and problems in the field of analytical chemistry, and planning, executing and reporting the results of an experiment or investigation.

Team player/worker: Capable of working effectively in diverse teams in classroom, laboratory, industry and field-based situations.

Skilled project manager: Capable of identifying/mobilising appropriate resources required for a project, and manage a project through to completion, while observing responsible and ethical scientific conduct; and safety and chemical hygiene regulations and practices.

Digitally literate: Capable of using computers for chemical simulation and computation and appropriate software for analysis of data, and employing modern library search tools to locate, retrieve, and evaluate analytical chemistry related information.

Ethical awareness/reasoning: Avoiding unethical behaviour such as fabrication, falsification or misrepresentation of data or committing plagiarism, and appreciate environmental and sustainability issues.

Lifelong learners: Capable of self-paced and self-directed learning aimed at personal development and for improving in knowledge/skill development and reskilling.

5. Qualification descriptors for PGDAC programme

The qualification descriptors for a Post Graduate Diploma in Analytical Chemistry programme will demonstrate:

- an understanding of the academic field of study as a whole and its applications, including a critical understanding of the established theories, principles and concepts, and of a number of advanced and emerging issues
- procedural knowledge related to the subject area of analytical chemistry, including research and development, teaching and government and public service
- skills in areas related to analytical chemistry specialization and current developments in this area
- comprehensive knowledge of current research, scholarly, and/or professional literature, relating to essential and advanced learning areas pertaining to analytical chemistry
- techniques and skills required for identifying analytical chemistry-related problems and issues
- identification of needs, collection of relevant quantitative and/or qualitative data from a wide range of sources, analysis and interpretation of data using methodologies as appropriate to the concerned area of research
- knowledge, understanding and skills for critical assessment of a wide range of ideas and complex problems
- communication of the results of studies undertaken in the relevant area using the main concepts, constructs and techniques of analytical chemistry
- application of one's knowledge and understandings relating to analytical chemistry
- identification and analysis of problems and issues and seek solutions to real-life problems
- skills that are relevant to some of the chemistry-related jobs and employment opportunities.

6. Programme learning outcomes relating to PGDAC programme

The students graduating with the Post Graduate Diploma in Applied Statistics programme should be able to:

- demonstrate a systematic understanding of the fundamental concepts, principles and processes concerning analytical chemistry as a whole and the specific techniques
- develop procedural knowledge that creates different types of professionals in the field of analytical chemistry and related fields such as pharmaceuticals, chemical industry, teaching, research, environmental monitoring, product quality, consumer goods industry, food products, cosmetics industry, etc.
- acquire skills in the area of analytical techniques depending upon the type of analysis
- apply appropriate methodologies in order to conduct chemical analyses or other chemical investigations; and apply relevant knowledge and skills to seek solutions to problems that emerge during the analyses
- use chemical techniques relevant to academia and industry, generic skills and global competencies, including knowledge and skills that enable students to undertake further studies in the field of analytical chemistry or a related field, and work in the chemical and non-chemical industry sectors.
- undertake hands on lab work and practical activities which develop problem solving abilities required for successful career in pharmaceuticals, chemical industry, teaching, research, environmental monitoring, product quality, consumer goods industry, food products, cosmetics industry, etc.
- recognise and appreciate the importance of analytical chemistry and its application in an academic, industrial, economic, environmental and social contexts
- inculcate a problem solving approach by coordinating different analytical techniques

7. Course-level learning outcomes

MCH-001: Basic Analytical Chemistry

The learners will be able to:

- distinguish between various analytical techniques;
- classify the chemical, electrical, optical, nuclear, and thermal methods of analysis;
- classify the separation methods;
- find the proper use of significant figures in measurement and calculations;
- understand error and types of errors in measurements;
- define some common terms of statistical calculations;
- analyse the data with the help of control charts;
- explain the factor relevant to sampling and sampling methods;

- understand the classification of hazardous materials ;
- understand safety of the glassware and their storage;
- explain basic structure of analytical instruments;
- explain the role of computer in analytical chemistry;
- understand the meaning of acid-base equilibria and neutralization titration;
- perform and explain Redox and complexometric titrations; and
- perform and explain precipitation titration and gravimetric analysis.

MCH-002: Separation Method

The learners will be able to:

- discuss the scope and importance of various separation methods;
- classify different methods on the basis of properties and equilibrium and rate processes;
- select the appropriate separation method in a given situation;
- explain general principles involved and the terms used in solvent extraction;
- describe different types of extracting systems based on the mechanism of extraction by distribution, compound formation, solvation and ion pair formation;
- discuss different types of extraction equilibria and factors affecting it;
- describe different types of chromatographic techniques;
- explain the terms involved in chromatographic techniques;
- discuss the principle involved, experimental procedure, and applications of liquid column chromatography;
- explain the principle involved, set up the apparatus and perform planar chromatography;
- discuss basic aspects of gas chromatography and its applications;
- explain the basic principle, experimental aspects and applications of HPLC;
- classify ion exchanges and discuss their methods of synthesis;
- explain important properties of resins and describe specific ion exchangers;
- discuss the principle and applications of ion exchange chromatography,
- define gels and explain their synthesis and properties;
- discuss the important applications of size exclusion chromatography ;
- discuss important membrane processes and the mechanism involved in separations through membranes;
- explain salient features of osmosis, reverse osmosis, dialysis and their applications; and
- describe important aspects of different forms of electrophoresis.

MCH-003: Spectroscopic Methods

The learners will be able to:

- explain the origin of various types of atomic and molecular spectra;
- state the principles of different spectrometric methods;
- describe the types and the principles of the instruments used in different spectroscopic methods;
- outline the significant analytical applications of different spectroscopic methods;
- suggest suitable spectrometric methods that may be employed for a given analytical determination; and
- apply the acquired knowledge in designing suitable experiments for the area of your interest.

MCH-004: Electroanalytical and other Methods and other Methods

The learners will be able to:

- identify common electroanalytical, thermal and radioanalytical methods for characterization and identification of a sample;
- classify electroanalytical, thermal and radioanalytical methods in different groups;
- describe the basic principles of some important techniques of electroanalytical, thermal and radioanalytical methods; and
- discuss advantages and limitations including cost effectiveness of different electroanalytical, thermal and radioanalytical methods.

MCHL-001: Basic Analytical Chemistry Lab

The learners will be able to:

- state the importance of calibration of volumetric apparatus and the analytical weights and outline the principle such calibrations;
- perform calibration of burette, pipette and standard (or volumetric) flask, and fractional weights;
- plot a normal distribution curve for a series of data;
- explain the principle underlying the gravimetric determination of tin in brass, and nickel in steel;
- perform the gravimetric determination of tin in brass, and nickel in steel;
- determine pka of phosphoric acid titrimetrically;

- define different types of hardness and alkalinity of water;
- state and explain the principle of acid-base titration with special reference to the determination of alkalinity of a water sample;
- explain the principle of complexometric determination of hardness of water;
- determine alkalinity and hardness of a given sample of water;
- state and explain the principle of iodimetric and iodometric titrations;
- perform iodimetric determination of ascorbic acid in vitamin C tablets, and iodometric determination of available chlorine in bleaching powder;
- define precipitation titrations and explain the principle of precipitation titrations with reference to the determination of silver ions in an aqueous solution;
- state and explain the principle of the determination of zinc ions in a given solution by precipitating them with potassium ferrocyanide; and
- perform the determination of chloride ions and zinc ions using precipitation titrations.

MCHL-002: Separation Method Lab

The learners will be able to:

- describe the principle involved and technique used in each of the experiments;
- plan the experiment and arrange all the required chemicals, solutions, apparatus etc. before starting the experiment;
- perform the experiment successfully as described in the procedure to be followed;
- record and analyse your observations and results; and

MCHL-003: Spectroscopic Methods Lab

The learners will be able to:

- explain the principle underlying UV-VIS spectrophotometric determination of metal ions their mixtures and of organic compounds at low concentrations;
- make absorbance measurements on a spectrophotometer and quantitatively analyse the given analyte samples for their content;
- determine the pK_a of an acid-base indicator using the pH versus absorbance data;
- perform the turbidimetric determination of sulphate ions in a water sample;
- identify the presence of different functional groups in an organic compound using its IR spectrum;
- identify the presence of different functional groups and other structural features in an organic compound on the basis of its NMR spectrum;

- establish the structure of the organic compound on the basis of its IR, NMR and Mass spectra;
- perform a flame photometric determination, and determine the concentration of sodium and potassium ions in a given sample;
- suggest suitable spectrometric methods that may be employed for a given analytical determination; and
- apply the acquired knowledge in designing newer experiments for the area of your interest.

MCHL-004: Electroanalytical and other Methods Lab

The learners will be able to:

- explain the basic concepts pertaining to potentiometry, pH-metry, polarography, amperometry and radiotracer techniques;
- state the principle involved in the measurements of potential, pH, conductance and determination of equivalence points in acid – base titrations;
- explain the principle of polarographic methods and amperometric methods in quantitative analysis; and
- state and explain the principle involved in radiotracer techniques.

8. Teaching-learning processes

In PGDAC, alike all other distance education programmes, face-to-face contact between the learners and their tutors/counsellors is relatively less therefore the print material, now available also in the digital form, is self instructional in nature. The *e-Gyankosh* is the handiest source of the study material and has an easy access. Therefore, counselling sessions slated for the academic support are an important activity in the whole teaching-learning process. The purpose of such a contact is to answer some of the questions and clarify the doubts, which may not be possible through any other means of communication. It also intends to provide an opportunity to meet fellow students. Besides these sessions, the support is by means of interactive counseling sessions and live teleconferencing. The learners are using email and phone as the other means of dealing with their problems.

Similar to theory counseling sessions, the lab courses have sessions that are very intense imparting skills required for the programme.

9. Assessment methods

The evaluation of the performance of the students will be based on two aspects: (i) continuous evaluation and (ii) term-end examination. In order to successfully complete the course, a student is required to pass in both the components and attain at least 35% marks in each.

The continuous assessment for all the theory courses is through assignment that has 30% weightage in the final score. The weightage of the term-end exam result is 70%. The Division will be awarded on the basis of total marks obtained by the student in all the eight courses, inclusive of theory and practical components.

For the assessment in lab courses, every experiment is evaluated for the continuous assessment and is included for final evaluation, the weightage being 70%. These experiments are called the **Guided experiments**. Hence, a student has to perform all the experiments in order to be able to secure good marks. The remaining 30% weightage is for the term-end exam assessed by the **Unguided experiment(s)** assigned to the student on the last day of the laboratory work for each course. These experiments are to be performed without the assistance of the counsellor.

4. POST GRADUATE DIPLOMA IN APPLIED STATISTICS PROGRAMME(PGDAST)

Dr. Manish Trivedi,(Programme Coordinator, PGDAST)
SOS

1. Introduction:

Statistics as a subject is an important branch of knowledge and is devoted to various techniques of collection, presentation, analysis and interpretation of data. It is a science of learning from data. The subject provides tools for making decisions when conditions of uncertainty prevail. Hence Statistical tools and techniques are used in almost all fields which are indispensable for people working in fields like agriculture, business, management, economics, finance, insurance, education, biotechnology and medical science, etc. For the last two decades, large amount of data has been handled with the help of computers and more sophisticated statistical techniques can be used in an effective manner to draw valid conclusions. Knowledge of different aspects of Statistics has become crucial in the present scenario.

There is a continuous demand for statisticians in fields of education, industry, software and research. The syllabi of one-year Post Graduate Diploma in Applied Statistics programme in Statistics are framed in such a way that the students at the end of the course, can be thorough in statistical techniques for pursuing higher studies and simultaneously can apply statistical tools judiciously to a variety of data sets to arrive at some valid conclusions.

Post Graduate Diploma in Applied Statistics programme consists of 32 credits spread over two semesters. This programme emphasizes both theory and applications of statistics and is structured to provide knowledge and skills in depth necessary for the employability of students in industry, other organizations, as well as in academics.

2. Learning Outcomes Based Approach to Curriculum Planning

2.1 Nature and Extent of the Post Graduate Diploma in Applied Statistics programme

The Post Graduate Diploma in Applied Statistics programme has some unique features such as basic core courses along with the elective courses including practical training on realistic problems, and extensive insight into statistical computations using M S Excel are used in all practical courses. The course has been designed in such a way that besides the core courses, a student can opt for outcome based elective courses from the streams such as Industrial Statistics or Bio-Statistics. Providing the Formulae and Statistical Table Booklet in the Term end exams is one of the important aspect of this programme which motivates the students to focus on application oriented aspects of the statistical tools and methodologies in different areas. Post Graduate Diploma in Applied Statistics programme is of one to three years

duration, with semester pattern. During first semester, students will be given the basic core information that includes methods of data collection, representation and summarization through the statistical tools and techniques of mathematical statistics. Further, they will be introduced to probability and probability distributions along with applications, correlation and regression techniques. During the semester, students are also expected to study statistical inference, designs of experiments and sampling techniques.

During the second semester, some theory papers and practicals deal with theoretical as well as applied aspects of statistics under elective fields Industrial Statistics or Bio-Statistics.

2.2 Aims of Post Graduate Diploma in Applied Statistics programme in Statistics:

To prepare the human resource who are not only statistically sound but also capable of using their appropriate statistical skills in interdisciplinary areas such as finance, health, agriculture, government, business, industry, telecommunication, and bio-statistics. As a result, they can pursue their future career either in the core field or in the applied field of Statistics.

- To familiarize students with computational techniques and software used in the statistical arena.
- To provide a solid ground in the best practices of collating and disseminating information.
- To prepare students for undertaking further study.
- To teach students to construct practical statistical models for several processes in the real-world.

3. Graduate Attributes in Statistics

Disciplinary Knowledge: The proposed curriculum of Post Graduate Diploma in Applied Statistics programme is expected to provide the students a good overall knowledge of Statistics covering various aspects. As a result, they will not only be able to understand the important statistical techniques but also able to apply some commonly used statistical techniques to other fields.

Critical Thinking: The proposed course is designed to enrich the students with ability to examine basic statistical issues in a more logical and methodical manner. It is expected that the students will strengthen themselves both computationally and analytically.

Problem Solving: The students will be able to examine various hypotheses involved, and will be able to identify and consult relevant resources to find their rational answers.

Analytical Reasoning: The students are expected to develop capability to identify logical flaws and loopholes in the arguments of practicing Statisticians, analyze and synthesize data from a variety of sources and accordingly draw conclusions.

Research Related Skills: The students should be able to develop original thinking for formulating new problems and providing their solutions. As a result, they will be able to develop thought provoking skills for their own subject as well as for those who are practicing Statistics.

Communication Skills and Team Work: The students are expected to develop effective and confident Communication skill after completion of the course. They will have an ability to work in a team as well as in isolation.

Moral and Ethical Awareness: After completion of the course, the students are expected to develop ethical and social responsibility as well. As a result, the students will be able to identify ethical issues, avoid unethical behavior such as fabrication, falsification or misrepresentation and misinterpretation of data.

Scientific Reasoning: The students will be able to analyze, interpret and draw appropriate conclusions from both quantitative and qualitative data and critically evaluate ideas, evidence and experiences with an unbiased and consistent approach.

Reflective thinking: The students should be sensitive to real experiences with respect to self, society and nation.

Information/Digital literacy: The proposed course is expected to develop digital literacy among the students for using ICT in different learning situations. The students should be able to equip themselves with in depth programming and simultaneously use appropriate Statistical software for Statistical computing.

Self-directed Learning: The students are expected to be familiar with data collection, compilation, analysis and interpretation and writing of project reports independently.

Multicultural Competence: The students are expected to be aware of values and beliefs of different cultures and have a global perspective by examining various forms of primary and secondary data resources.

Leadership Readiness/Qualities: The students will be capable of mapping out the tasks of a team or an organization, formulating an inspiring vision, building a team for achieving the desired objectives, motivating and inspiring team members accordingly, and using management skills to guide people in the right direction smoothly and efficiently.

Lifelong Learning: The proposed course is designed to develop independent, coherent and decisive thoughts among the students that will ultimately develop competency in their lives.

4. Qualification Descriptors

The qualification descriptors for a Post Graduate Diploma in Applied Statistics programme will demonstrate

- (i) a systematic knowledge of an academic field of study and its applications with a number of emerging issues,
- (ii) procedural knowledge that creates professionals in the field of Statistics including government and public services,
- (iii) skills in the areas related to current developments in applications of Statistics.
- (iv) skills in collection of relevant quantitative and/or qualitative data, analysis and interpretation of data using appropriate statistical methodologies.
- (v) use knowledge, understanding and skills for critical assessment of a wide range of ideas and complex problems and issues relating to the chosen field of study.
- (vi) communicate the results of studies undertaken in statistics in a range of different contexts using the main concepts, constructs and techniques of the subject.
- (vii) address one's learning needs relating to current and emerging areas of study,
- (viii) making use of professional materials as appropriate, including those related to new frontiers of knowledge.
- (ix) apply one's statistical knowledge and skills to several contexts and to identify and
- (x) analyze problems and issues and seek solutions to real-life problems.
- (xi) demonstrate subject-related skills that are relevant to some of the job trades and employment opportunities.

5. Programme Learning Outcomes in Post Graduate Diploma in Applied Statistics programme

The student graduating with the Post Graduate Diploma in Applied Statistics programme should be able to

1. Demonstrate the ability to use skills in Statistics and different practicing areas for formulating and tackling Statistics related problems
2. identify and apply the appropriate principles and methodologies to solve a wide range of problems associated with Statistics.
3. Acquire fundamental/systematic understanding of the academic field of Statistics and its different learning areas and applications.
4. Recognize the importance of statistical modeling and computing, and the role of approximation and mathematical approaches to analyze the real problems using various statistical tools.
5. Plan and execute Statistical experiments or investigations, analyze and interpret data/information collected using appropriate methods, and interpret accurately the findings of the experiment/investigations.

6. Demonstrate problem-solving skills that are required to solve different types of Statistics related problems with well-defined solutions, and tackle open-ended problems that belong to the disciplinary-area boundaries;
7. Perform investigative skills, including skills of independent thinking of Statistics-related issues and problems;
8. Acquire the communication skills involving the ability to listen carefully, to read texts and reference material analytically and to present information in a concise manner to different groups/audiences of technical or popular nature;
9. Demonstrate analytical skills involving paying attention to detail and ability to construct logical arguments using correct technical language related to Statistics and ability to translate them with popular language when needed;
10. Attain ICT skills as well as personal skills such as the ability to work both independently and in a group.
11. Demonstrate professional behavior such as (i) being objective, unbiased and truthful in all aspects of work and avoiding unethical, irrational behavior such as fabricating, falsifying or misrepresenting data or committing plagiarism; (ii) the ability to identify the potential ethical issues in work-related situations; (iii) appreciation of intellectual property, environmental and sustainability issues; and (iv) promoting safe learning and working environment.

5.1. Course Learning Outcomes

MST-001: Foundation of Mathematics and Statistics

Students will acquire

- apply concepts of set theory to solve real life problems.
- apply counting principles such as addition, multiplication and subtraction to count the number of ways of happening different events.
- apply concepts of continuity, differentiability and integration
- solve simple problems based on matrices and determination.
- insights into preliminary exploration of different types of data.
- identify the type of graph to visualize different characteristics of the data.
- knowledge of Statistics and its scope and importance in various areas such as Medical, Engineering, Agricultural and Social Sciences etc.

MST-002: Descriptive Statistics

Students should be able to

- show familiarity with some of the basic methods of analysis of both univariate and bivariate data.
- describe and use some measures based on central tendency, dispersion, skewness and kurtosis which are used to explore the properties of a distribution.

- demonstrate the concept of statistical relationship between two variables for determining the strength of relationship.
- elaborate the average relationship between two variables in terms of regression analysis and use explore the multiple and partial correlation in large scale data.
- describe the qualitative characteristics and analysis of qualitative data which arises when a sample from the same population is classified with respect to two or more qualitative variables.
- make themselves aware of the quantitative and qualitative techniques of statistics and their applications.
- knowledge of other types of data reflecting quality characteristics including concepts of independence and association between two attributes,
- Knowledge of correlation, regression analysis, regression diagnostics, partial and multiple correlations.

MST-003: Probability Theory

Students should be able to

- distinguish between random and non-random experiments,
- conceptualize the probabilities of events including frequentist and axiomatic approach. Simultaneously, they will learn the notion of conditional probability including the concept of Bayes' Theorem,
- describe discrete and continuous random variables and their probability distributions including expectation and moments,
- demonstrate the knowledge of important discrete and continuous distributions such as Binomial, Poisson, Geometric, Negative Binomial and Hyper-geometric, normal, uniform, exponential, beta and gamma distributions,
- use or apply standard discrete and continuous probability distributions to different situations.

MST-004: Statistical Inference

The students should be able to:

- conceptualize the law large numbers and Central limit theorem and explore its applications in statistics
- describe the random sample from a distribution, sampling distribution of a statistic, standard error of important estimates such as mean and proportions,
- understand and explain important inferential aspects such as point estimation, test of hypotheses and associated concepts,
- equip with the concept about non-parametric method and some important non-parametric tests.
- estimate the unknown parameters which may face in real life.

- apply the parametric tests (z, t, F and X² tests) and non-parametric tests (sign, Wilcoxon – signed-rank goodness of fit, kruskal-Wallis, Friedman tests) to real life situations
- draw inference about population on the basis of sample observations.

MST-005: Statistical Techniques

The students should be able to

- basic knowledge of complete enumeration and sample, sampling frame, sampling distribution, sampling and non-sampling errors, principal steps in sample surveys, limitations of sampling etc.,
- introduce and identify various sampling schemes such as SRS, stratified and systematic sampling.
- conduct the sample surveys and selecting appropriate sampling techniques,
- carry out one way and two way Analysis of Variance test and interpret the results in different level of situations,
- understand the basic terms used in design of experiments and use appropriate experimental designs to analyze the experimental data, and give statistical interpretation of the experimental results obtained.

MSTL-001: Basic statistics Lab

Learners will be able to

- develop practical skills to classify qualitative as well as quantitative data, represent data diagrammatically or graphically using MS Excel 2007 and interpret them.
- compute measures of central tendency, dispersion, moments, skewness, kurtosis and also determine the linear relationship between two or more variables in MS Excel 2007.
- demonstrate parametric tests such as Z, t and Chi-square tests for one sample problems as well as Z, t, Chi-square and F-tests for two sample problems using MS Excel 2007 for any given data.
- understand the analysis of variance and demonstrate how to apply ANOVA to analyse experimental data using MS Excel 2007.

Elective Courses of Industrial Statistics:

MSTE-001: Industrial Statistics-I

Learners will be able to

- apply the statistical techniques and tools in industries and business.
- control the process and product by using various control charts and different sampling plans.
- identify optimum strategy under different environments uncertainly risk and conflict. calculate and in prove the reliability of a system.

MSTE-002: Industrial Statistics-II

This course is meant to acquaint the students with some important but useful concepts on topics in time series analysis so that the students can get an important background material for taking up an advanced course in financial econometrics and data analysis. After completion of this course, the students should be able to:

- (a) time series data, its applications to various fields and components of time series,
- (b) fitting and plotting of various growth curves such as modified exponential, Gompertz and logistic curve,
- (c) fitting of trend by Moving Average method,
- (d) measurement of Seasonal Indices by Ratio-to-Trend , Ratio-to-Moving Average and Link Relative methods,
- (e) calculation of variance of random component by variate component method,
- (f) applications to real data by means of laboratory assignments.

MSTL-002: Industrial Statistics Lab

Learners should be able to:

- grasp the significance of constructing suitable control charts for variables as well as attributes to distinguish between the variation in a process resulting from chance causes and the variation resulting from assignable causes in MS Excel 2007 and interpret them.
- develop practical skills to determine a mathematical relationship between the response variable and one or more predictor variables and its related analysis using MS Excel 2007. Learners will also be able to apply the regression technique for any given data.
- acquaint with the forecasting techniques for the given time series using MS Excel 2007. Learners will also be able to compute trend values and seasonal indices, smooth (or filter out) the seasonal and irregular effects and deseasonalise the data.

Duration: Minimum – One year; Maximum – Three years.

Medium of Instruction: English

Eligibility: Graduate in any discipline from recognised University/Institution/Organisation is eligible for this programme.

Programme Fee: ₹7200/-

Counselling Sessions

In distance education, fact-to-face contact between the learners and their tutors/counsellors is relatively less and, therefore, is an important activity. The purpose of such contacts is to answer some of learners' questions and clarify his/her doubts which may not be possible through any other means of communication. There are academic counsellors at the Study Centres to provide counselling and guidance to the learner in the courses that they have chosen for study. Normally, these sessions will be held at the Study Centres during weekends (**Saturdays and Sundays**).

The candidates should note that the counselling sessions will be very different from the classroom teaching or lectures. Counsellors will not be delivering lectures as in conventional teaching. They will try to help the learners to overcome difficulties which they face while studying. In these sessions, the learner must try to resolve his/her subject-based difficulties and any other related problems.

Before going to attend the counselling sessions, please go through the course materials and make a plan of the points to be discussed. Unless you have gone through the units, there may not be much to discuss.

The detailed schedule of the counselling sessions for both theory and lab courses will be informed to the learners by the Coordinator of their Study Centre.

- **Theory Counselling**

Each of all the theory courses of this programme will have 4-5 counselling sessions each of 2-3 hours. The sessions for theory counselling are not compulsory to attend.

- **Lab Counselling**

For each lab course 6 counselling sessions each of 4 hours for 3 days will be held at the study centre. However, if the candidate is capable of doing each and every exercises given at the end of each lab sessions in the lab manuals of the lab courses, he or she may be allowed to attend one day out of the scheduled 3 days of counseling sessions with condition that he or she has to submit the record book consists of printout of the solved lab exercises in MS Excel 2007 and demonstrate his or her capabilities before the counsellor, i.e., the maximum number of Lab sessions should be 6 sessions (3 days) for each lab course and compulsory attendance of learners should be 2 sessions (1 day) at the Study Centre for demonstrating their capabilities and for continuous assessment of their work. You should bear in mind that **if the counselor before whom the candidate will demonstrate, does not find satisfactory performance then candidate has to attend all the counseling sessions and solve all the lab exercises under the guidance of the counsellor.**

The students are advised to complete the lab courses within a year from registration, otherwise pro-rata fee of Rs. 400/- per course will be charged for re-registering for the missed/repeat lab sessions.

Please note the followings:

- i) Each practical session is of four hours duration
- ii) Two sessions of four hours each will be held each day.
- iii) The system of evaluation, both for theory courses and practical course is as follows:

EVALUATION METHODOLOGY:

Theory Evaluation: For theory courses, evaluation comprises three aspects:

- a) Self-evaluation exercises within each unit of study (non-credit).
- b) Continuous evaluation in the form of compulsory tutor marked assignments. This carries a weightage of 30% for each course. The scores of the tutor marked assignment will be considered for declaring the students successful in that course.
- c) The term-end evaluation has a weightage of 70% in every theory course.

Practical Evaluation: Evaluation of the practical course comprises of the following two aspects:

- a) Continuous evaluation of lab exercises is done at the programme/study centre by the counsellor. Evaluation of lab exercises which learners do throughout the semester under the guidance of their counsellor(s) at the programme/study centre constitutes continuous evaluation and carries 30% weightage. The candidates must get the print out of the excel file of the solution related to each exercise checked and signed by their counsellor and maintain a record book of these signed lab exercises. This record book will be a part of their continuous assessment and will be required to submit before the term-end lab examination to the Programme Coordinator/Counsellor at Study Centre.

Every lab exercise is evaluated and is included for final evaluation, the weightage for the continuous assessment is 30%, out of which 10% for the record book and 20% for the assignments. These lab exercises are to be performed under the guidance of a counsellor. Hence, a student has to perform all the lab exercises in order to be able to secure good marks.

- b) Term-End evaluation of performance in the lab exam carries a weightage of 70% for each lab course. The evaluation of lab exercises assigned to the learner in Term-end practical exam on the scheduled day at the Programme/Study centre constitutes term-end evaluation and carries 70% weightage out of which 50% is allotted for term-end exam and 20% for Viva-voce. The schedule of term-end lab examination will be notified to the learners by the Coordinator of their Programme/Study Centre and intimated to the eligible candidates by the Regional centre.

Qualifying Marks: You will have to obtain at least 40% marks in each course (both in theory and lab) in both continuous and term end evaluation separately. However, the overall average should also be at least 40% for the successful completion of a course.

Overall Marking: The final Marking for each course is computed by combining continuous evaluation score and term-end examination score.

The University is following numerical marking system for continuous evaluation as well as term-end examination. The evaluators are required to award numerical marks in assignments, lab activities and term-end examination. The notional correlates of the letter grades and percentage of marks are as follows:

Letter Grade	Qualitative Value	Division	Equivalent percentage Range of numerical marks
A	Excellent	First division with Distinction	80% and above
B	Very good	First division	60% but less than 80%
C	Good	Second division	50% but less than 60%
D	Satisfactory	Third division	40% but less than 50%
E	Unsatisfactory	Fail	Less than 40%

In order to be able to appear for the Term-End examination, it is pre-requisite that the students submit all the assignments according to the prescribed schedule. The students are required to give an undertaking to this effect in the examination form and it should not be later found that they had, in fact, not submitted the assignments as prescribed, otherwise the results of the term-end examination will be treated as cancelled.

Assignments

Assignments are a compulsory component of the courses. Assignments are uploaded in the IGNOU website or sent to the study centres.

The main purpose of the assignments is to test learner's comprehension of the learning material which they will receive from us and also to help them get through the course by providing feedback to them. These assignments will be checked by their counsellors, who will also explain the candidate, where and how he/she can improve his/her understanding. The information given in the printed course material is sufficient for answering the assignments. However, to take the learner a little further, he/she can always refer to other books assessable to him/her.

These assignments are to be submitted at the programme study centre, according to the submission schedule provided in the assignments booklet. Before submission, a candidate should ensure that he/she has answered all the questions in all assignments. Incomplete answer sheets bring their poor grades.

CERTIFICATE PROGRAMMES

5. CERTIFICATE PROGRAMME IN LABORATORY TECHNIQUES (CPLT)

Prof. Lalita S. Kumar, (Programme Coordinator, CPLT)
SOS

1. Introduction

Laboratories play an important role in teaching, research and development in science and technology. The laboratory technicians who manage these are untrained and thus unable to provide the level of service needed to ensure the smooth functioning of a laboratory.

The laboratory technicians operate at different levels and require a variety of skills and knowledge. A laboratory technician in a school or college not only has to manage the day-to-day running of the laboratory, by providing the equipment and apparatus required for demonstrations and practical work, but also has to maintain the apparatus, ensure safety and proper disposal of laboratory wastes, prepare solutions and gases, maintain stocks, and so on. Laboratory technicians working in universities, national laboratories and industry require very specialised skills, depending upon the area of specialisation of the laboratories concerned. However, even the technicians in such specialised laboratories are not trained and most of them have acquired the skills and knowledge they need on the job. Many of the skill required by the school and college laboratory staff are also needed by laboratory technicians in research laboratories and industry.

CPLT launched for the first time in July 2001 was a 18 credit certificate programme with 4 core courses in all in which the first course is common to all the labs while the other three pertain to the laboratories in chemistry, life sciences and physics. All the courses had integrated lab component worth 2 credits each. The programme is offered in Hindi and English languages. As for all the certificate programmes of IGNOU, this is also of six months duration with a flexibility of completing in two years time. After almost 14 years of running the programme, it was revised and the revised programme was launched in Jan 2017. The revised version has 4 theory and 4 lab courses, in all 8 courses.

2. Nature and Scope of the CPLT

The curriculum of CPLT was designed keeping in mind the skill enhancement and capacity building of the laboratory staff employed in college and school science labs, as also the skill development of aspirants for employment in such labs. The skill required to be augmented with sufficient theoretical background. The process at the initial stages involved all the stakeholders; people from industry, national labs and from the labs of Schools and Colleges including some of the potential candidates. This resulted into a curriculum having a 50% weightage of hands-on work in all the discipline based courses while it is ~ 48% in the first general course. The rest of it is dedicated to the theory courses. The theory and laboratory principles and procedures of various laboratory techniques have been covered in the print materials. Each of the discipline based theory courses consists of two blocks each covering

text worth two credits. The general course has three blocks for four credits coverage. The laboratory experiments have been covered in one block containing practical work worth two credits each for all the four courses. A mix of theory and laboratory work enables the learners to get well equipped with the skills required by the employing agencies.

The certificate holders would have a scope to get employed in all the science laboratories that have a requirement of persons involved in some type of qualitative and quantitative experiments. Besides a scope of employment for the fresher, there is a good opportunity for the capacity building of those who are already employed and have not undergone a formal training. The latter can have skill enhancement and can work more efficiently. The programme is particularly useful for persons working or aspiring to work in School science laboratories. Since this certificate programme equips with the skills that can be used for any analytical work without the use of sophisticated instruments, the persons with this qualification may get an entry into different testing labs like water quality and food adulteration testing labs. Such labs exist in large numbers in the country.

3. Aims of the CPLT programme

The overall aims of CPLT are to:

- familiarise with the basic facilities in science laboratories,
- impart the basic skills of organising and managing science laboratories,
- provide the skills of operation and maintenance of the equipment used in science laboratories,
- provide the procedures of procurement and storage of laboratory equipment and materials,
- equip with the skills in common science laboratory techniques, and
- familiarise with the appropriate disposal procedures and safety methods.

4. Characteristic attributes of a graduate in CPLT

Disciplinary knowledge and skills: Capable of demonstrating comprehensive knowledge and understanding of major concepts, theoretical principles in laboratory techniques and applications of various techniques in various day-to-day functions of the laboratory staff.

Skilled communicator: Ability to transmit complex technical information relating to analytical methods in a clear and concise manner in writing and oral.

Critical thinker and problem solver: Ability to employ critical thinking and efficient problem solving skills in dealing with day-to-day operations of a science lab in general and specific to discipline based lab.

Sense of inquiry: Capability for asking relevant/appropriate questions relating to issues and problems in the planning, executing and reporting the results of an experiment so as to meaningfully assist the students working in the lab and the teacher of that particular lab work.

Team player/worker: Capable of working effectively in diverse teams in the concerned laboratory, industry and field-based situations. Should be able to seek cooperation from the fellow workers and be able to cooperate in the related activities.

Skilled project manager: Capable of identifying/mobilising appropriate resources required for a particular experiment, while observing responsible and ethical scientific conduct; and safety and chemical hygiene regulations and practices. Should be well equipped with maintenance of stock register and day-to-day maintenance of records.

Digitally literate: Capable of using computers for various activities of the lab like, maintaining records of students, apparatus/equipment, chemicals, etc. An awareness of at least some basic computer applications e.g., use of word, excel, power point, other essential software, etc. Should be able to enter and retrieve data as and when required.

Ethical awareness/reasoning: Avoiding unethical behaviour such as helping the students in fabrication, falsification or misrepresentation of data or committing plagiarism, and appreciate environmental and sustainability issues.

Lifelong learners: Capable of self-paced and self-directed learning aimed at personal development and for improving in knowledge/skill development and reskilling. The new techniques keep getting introduced in the laboratory work, there should be an attitude to learn new knowledge and skills for the sake of sustainability.

5. Qualification descriptors for CPLT

The qualification descriptors for Certificate Programme in Laboratory Techniques will demonstrate:

- an understanding of the theoretical concepts involved and procedural knowledge related to the subject area of laboratory techniques, including laboratory organisation and management
- techniques and skills required in chemistry, biology and physics labs related the experiments generally conducted in the school and college science labs
- identification of apparatus, chemicals as per the requirement
- knowledge, understanding and skills for critical assessment of a wide range of ideas and expected problems that may appear during the lab work
- application of one's knowledge and understandings relating to techniques learnt at lower levels to higher levels of study
- skills that are relevant to some of the lab related jobs and employment opportunities. The labs may also be from other labs like the food adulteration or water quality testing labs etc.

- understanding of the safety issues in science labs, tackling of emergency situations in the lab
- equipped well for assisting the person incharge of the lab

6. Programme learning outcomes relating to CPLT

The students graduating with the Post Graduate Diploma in Applied Statistics programme should be able to:

- demonstrate a systematic understanding of the fundamental concepts, principles and processes concerning laboratory techniques related to the chemistry, biology and physics labs
- develop procedural knowledge that creates skilled staff trained in different lab techniques
- acquire skills that are essential to not only the conduct of experiments in the science labs but also develop skills of organising and managing these labs
- apply appropriate strategies to operate and maintain the equipment used in science labs and apply relevant knowledge and skills to seek solutions to the problems that emerge during the conduct of experiments or an analysis
- undertake hands on lab work and practical activities which develop problem solving abilities required for assisting the teacher and the students while performing an experiment in the lab
- recognise and appreciate the importance of skills of laboratory organisation and management and the various techniques involved in the experimentation of different science labs
- identify the possible risks and hazards in science labs and act in the best possible manner
- apply the acquired lab skills in assisting the teaching staff efficiently and with good productivity

7. Course-level learning outcomes

CLT-101: Good Laboratory Practices

The learners will be able to:

- describe the role of a science laboratory technician and explain why it is important;
- explain what science is and distinguish it from non-sciences;
- describe how scientific knowledge is gained;
- explain the importance of laboratories in scientific investigation; and
- outline the core values of scientific way of life and discuss why these are important in your work.

CLT-102: Laboratory Techniques in Biology

The learners will be able to:

- describe typical features of a biology lab and its ancillaries and plan their organisation and procure and preserve plant material and maintain their stock;
- list the glassware and equipment used in a biology lab; and
- describe the method of setting up, handling and maintaining stereo and compound microscopes.

CLT-103: Laboratory Techniques in Chemistry

The learners will be able to:

- identify the common pieces of laboratory apparatus and equipment.
- clean, safely handle, repair, maintain, store and assemble laboratory apparatus and equipment;
- use various volumetric and mass measuring devices;
- adopt proper safety measures while working in a chemistry laboratory;
- prepare standard solutions and reagent solutions;
- state the importance and principles of various preparative, separation and purification techniques; and
- check the purity of a substance with the help of various chromatographic techniques.

CLT-104: laboratory Techniques in Physics

The learners will be able to:

- state what a typical physics laboratory contains and how things are arranged in it;
- explain how electric and water supplies are maintained in a physics laboratory; and
- classify physics apparatus according to its use.
- Identify common mechanical tools in a physics laboratory;
- choose the proper tool for the job you are required to perform;
- state the basic safety precautions to be observed while using these tools;
- list the steps required to maintain and store mechanical tools properly;
- list commonly used sources of light in a physics laboratory; and
- state the precaution in handling and maintenance of optical apparatus.
- Identify DC and AC power supplies, and state their uses;
- list the precautions for handling electrical and electronic apparatus; and
- state the requirements for maintain electrical and electronic apparatus.

CLTL-101: Good Laboratory Practices: Basic Exercises

The learners will be able to:

- state the design features of a laboratory, its preparation room and its store;
- follow the procedures for stock verification and other laboratory related items;
- follow proper procedures for electrical maintenance like wiring a plug;
- locate the supply lines of water, gas and electricity of a laboratory, and draw schematic sketch of the same;
- identify and enlist different fire extinguishers and describe how to use a carbon dioxide fire extinguisher;
- classify the chemical substances into different hazard types and use a fume cupboard for carrying out a
- chemical reaction; follow the procedure described for the disposal of unserviceable and obsolete items;
- state the principles behind the disposal of chemical wastes;
- compile the contents of a first aid box;
- follow the first aid procedure in laboratory related emergency situations; and
- apply the computer applications like
- MS Word and MS Excel in organising and managing a Science laboratory

CLTL-102: Basic Experiments in Biology

The learners will be able to:

- operate, care and maintain stereo and compound microscopes and other basic equipment found in a biology lab taking safety precautions,
- plant the organization of a typical biology laboratory,
- operate, care and maintain stereo and compound microscopes and other basic equipment found in a biology lab taking safety precautions,
- procure plant and animal materials required for conducting experiments and arrange biological specimens in a specific order in a museum or herbarium,
- set-up demonstration of some physiological experiments for students,
- prepare some simple slides and important fixatives, stains, reagents and microbial culture medium required for biological experiments,
- extract and observe DNA.

CLTL-103: Basic Experiments in Chemistry

The learners will be able to:

- state and follow the measures to be taken for safe working in a Chemistry laboratory
- identify the common pieces of apparatus and equipment used in a Chemistry laboratory,

- clean, safely handle, store and assemble apparatus and equipment in a Chemistry laboratory,
- perform simple laboratory operations like, boring a hole in a cork, cutting and bending a glass tube, servicing a Bunsen burner, using and maintaining an analytical balance,
- prepare distilled and deionised water,
- prepare solutions and laboratory reagents and perform dilutions, and
- perform simple experiments based on preparation, separation and purification techniques.

CLTL-104: Basic Experiments in Physics

The learners will be able to:

- identify various basic mechanical tools available in the physics laboratory;
- use combinationpilers to tighten objects;
- lift small objects using a piece of plywood board or wooden block in given size;
- hold the cut piece in a vice and use files to smoothen its faces;
- fix a screw in this piece using a screwdriver;
- fix a nail in a board using a hammer;
- list the precautions to be take while using these tools; and
- maintain these tools in good working conditions.

8. Teaching-learning processes

Like all other distance education programmes, the teaching-learning process is accomplished by self learning print materials, face-to-face contact between the learners and their tutors/counsellors through counseling sessions. The print material is available also in the digital form. The *e-Gyankosh* has an easy access for this purpose. The purpose of counseling sessions is to answer some of the questions and clarify the doubts, which may not be possible through any other means of communication. It also intends to provide an opportunity to meet fellow students. Besides these sessions, the support is by means of interactive counseling sessions and live teleconferencing. The learners are using email and phone as the other means of dealing with their problems.

Similar to theory counseling sessions, the lab courses have sessions that are very intense imparting skills required for the programme.

9. Assessment methods

The evaluation of the performance of the students is based on **only term-end examination**, the reason being the amount of lab work associated with the programme is 45%. Also within a span of six months for the programme, submission and evaluation of assignments is impractical. Therefore this is the only programme that **does not have an assignment**

component. Thus, the weightage of the term-end exam result is 100%. In order to successfully complete the course, a student is required to pass by attaining at least 35% marks. The Division will be awarded on the basis of total marks obtained by the student in all the eight courses, inclusive of theory and practical components.

For the assessment in lab courses, every experiment is evaluated for the continuous assessment and is included for final evaluation, the weightage being 70%. These experiments are called the **Guided experiments**. Hence, a student has to perform all the experiments in order to be able to secure good marks. The remaining 30% weightage is for the term-end exam assessed by the **Unguided experiment(s)** assigned to the student on the last day of the laboratory work for each course. These experiments are to be performed without the assistance of the counsellor.

6 (a). CERTIFICATE IN SOLID WASTE MANAGEMENT (CSWM)*

Dr. Deeksha Dave, (Programme Coordinator, CSWMC)
SOITS

Introduction

Solid waste generation is a growing concern of today. Not only the volume of waste generation has increased but also the nature and composition of waste has changed. The toxic and hazardous waste is dangerous for environment and mankind if not handled properly. In view of this, the programme is envisaged to address the issues and challenges in effective management of solid waste. The target learners of the programme are officers and staff working in municipal bodies, sanitary officers, sanitary inspectors, waste handlers, waste managers and people working in NGOs working in the area of waste management. It is 18 credit course with 3 courses of 6 credits each. The mode of delivery of this certificate programme is open and distance learning and medium of instruction is Hindi.

Nature and Scope of the Programme

There is a lack of trained and skilled man power in waste management in India and waste management is now increasingly being outsourced to private service providers by municipalities across India. In view of this, it is necessary to develop workforce who can provide services in this area. Looking at the present scenario and futuristic needs, and considering the outreach of IGNOU, the current programme is proposed. The proposed Programme is in line with the objectives of IGNOU to develop need based programmes. The programme will provide an overview of the solid waste management situation covering key elements of the waste management system, with its environmental, social, financial, legal and institutional aspects. Besides understanding the challenges the learners will learn about appropriate solutions and will render their services in the waste management sector.

Aims of the Programme

The overall aims of the Certificate in Solid Waste Management Programme are :

- To sensitize the learners about the problem of waste generation and its impact on environment and human health.
- To familiarize the learners to existing legislation, knowledge and practices regarding Waste Management in the country.
- To prepare the learners with the ability to manage the solid waste effectively.

**Programme under development and is to be offered in Hindi medium*

Characteristic attributes of the learner

Upon successful completion of the programme,

- *Disciplinary knowledge and skills*: Capable of demonstrating knowledge about the problem of waste generation and its environmental impact.
- *Skilled communicator*: Ability to use available means to convert waste into some useful resource.
- *Critical thinker and problem solver*: Ability to share the acquired knowledge among community, neighbourhood and society at large.
- *Sense of inquiry*: Capable of working in outdoor field locations.
- *Team player/worker*: Capable of thinking critically on the issues of waste generation and devising innovative solutions.
- *Skilled project manager*: Capable of self paced and self directed learning to carry out the waste management at the source level.
- *Ethical awareness/reasoning*: The basic foundation of the programme is the principle of ethics.
- *Lifelong learners*: Capable of self-directed learning aimed at enhancing and improving their knowledge on the contemporary global issues in achieving sustainable development at different level.

Qualification Descriptors

The qualification descriptors for Certificate in Solid Waste Management Programme may include the following

- Demonstrate the fundamental understanding of the current emerging issues of environmental science and its various problems particularly waste generation
- Communicate the knowledge to society
- Apply one's knowledge in real life situations and act accordingly.
- Demonstrate comprehensive knowledge about the various kinds of waste and its management.

Programme Learning Objectives

Expected Learning Outcomes:

- The programme will provide learners with the necessary means to develop the capacity to carry out independent waste management procedures.
- The learners will learn the know-how to analyze and segregate different types of waste and will be able to propose solutions according to local conditions.

- Doing this programme will expand awareness, foster entrepreneurship and provide a foundation for understanding and finding gainful employment in the waste management industries.
- The learners of the proposed programme would play a constructive role in industries, research and development organizations, NGOs, development projects, etc.

Course Level Learning Outcomes

Course-level learning outcomes relating to courses within CSWM programme are indicated course wise:

Course 1 : BEV 001 Introduction to Solid Waste

- Familiarize with the issue of Solid waste
- Define the solid waste
- Explain the causes and effects of solid waste generation.
- Explain the importance of waste segregation
- Recognize the importance of informal workers in waste management

Course 2: BEV 002 Municipal, Agricultural, Industrial and Hazardous Waste Management

- Describe the characteristics and nature of Municipal, Agricultural, Industrial and Hazardous Waste.
- Apply the knowledge in the effective management of Municipal, Agricultural, Industrial and Hazardous Waste.
- Encourage biocomposting and vermicomposting
- Devise solution to manage the horticultural, dairy and aquaculture waste
- Devise solutions to mitigate the effects of hazardous wastes

Course 3: BEV 003 Plastic, Electronic, Biomedical and Construction and Demolition Waste Management

- Describe the characteristics and nature of Plastic, Electronic, Biomedical and Construction and Demolition Waste
- Distinguish between thermosetting and thermoplastic.
- Distinguish between different types of biomedical waste
- List the alternatives which can be used in place of plastic
- To explain the impact of Plastic, Electronic, Biomedical and Construction and Demolition Waste on environment and human health
- Recognize the importance of EPR and other schemes of the companies to reduce waste

Teaching –learning processes

Development of sensitivity towards the issue of waste generation and its effects will constitute an important aspect of the teaching learning process. The learners will be informed about the harmful effects of improper waste management on their health and overall well-being. A variety of approaches to teaching learning process including lectures, counseling, interactive radio counseling, teleconferencing, will be conducted to achieve the programme objectives. Problem solving skills and higher order thinking skills of reason and analysis will be encouraged through discussions and sharing of ideas through audio and video programmes.

- **Learning Package:** The printed self learning study material will be sent to the student.
- **Counselling:** Counselling sessions will be organized according to a schedule drawn up by the study centre coordinator. Such sessions will be arranged during the weekends for the convenience of the learners.
- **Web Counselling:** Web based counseling sessions will also be arranged in the relevant areas through the available online platform of IGNOU from time to time.

Assessment Process

Formative Assessment will be done in the form of check your progress exercises in the text. The learners will be provided with virtual cases and problem based assignments and will be asked to demonstrate their knowledge on waste management. At the end, term end examination will be conducted to know about their understanding about various topics. The assignment for each course will be based on projects and case study reports. The learners will be made to analyse the situation and express their opinion.

- Continuous Assessment (30%)
- Term End Examination (70%)

6 (b). ठोस अपशिष्ट प्रबंधन में प्रमाण पत्र

स्कूल: अंतःविषय और ट्रांस-अनुशासनात्मक अध्ययन के स्कूल

डॉ. दीक्षा दवे, कार्यक्रम समन्वयक

परिचय

सॉलिड वेस्ट जनरेशन आज की बढ़ती चिंता है। न केवल अपशिष्ट उत्पादन की मात्रा बढ़ी है, बल्कि कचरे की प्रकृति और संरचना भी बदल गई है। जहरीले और खतरनाक कचरे को पर्यावरण और मानव जाति के लिए खतरनाक है अगर ठीक से नहीं संभाला जाए। इसे देखते हुए, ठोस कचरे के प्रभावी प्रबंधन में मुद्दों और चुनौतियों के समाधान के लिए कार्यक्रम की परिकल्पना की गई है। कार्यक्रम के लक्षित शिक्षार्थी नगर निकाय, सेनेटरी अधिकारी, सेनेटरी इंस्पेक्टर, अपशिष्ट संचालकों, अपशिष्ट प्रबंधकों और अपशिष्ट प्रबंधन के क्षेत्र में काम करने वाले गैर सरकारी संगठनों में काम करने वाले अधिकारी और कर्मचारी हैं। यह 6 क्रेडिट के 3 पाठ्यक्रमों के साथ 18 क्रेडिट कोर्स है। डिलीवरी का तरीका खुला और दूरस्थ शिक्षा है और शिक्षा का माध्यम हिंदी है।

कार्यक्रम की प्रकृति और स्कोप

भारत में कचरा प्रबंधन में प्रशिक्षित और कुशल मैन पावर की कमी है और कचरा प्रबंधन अब पूरे भारत में नगरपालिकाओं द्वारा निजी सेवा प्रदाताओं के लिए आउटसोर्स किया जा रहा है। इसे देखते हुए, कार्यबल विकसित करना आवश्यक है जो इस क्षेत्र में सेवाएं प्रदान कर सकते हैं। वर्तमान परिदृश्य और भविष्य की जरूरतों को देखते हुए, और इग्नू के आउटरीच को देखते हुए, वर्तमान कार्यक्रम प्रस्तावित है। प्रस्तावित कार्यक्रम जरूरत आधारित कार्यक्रमों को विकसित करने के इग्नू के उद्देश्यों के अनुरूप है। कार्यक्रम अपने पर्यावरण, सामाजिक, वित्तीय, कानूनी और संस्थागत पहलुओं के साथ अपशिष्ट प्रबंधन प्रणाली के प्रमुख तत्वों को कवर करने वाले ठोस अपशिष्ट प्रबंधन की स्थिति का अवलोकन प्रदान करेगा। चुनौतियों को समझने के अलावा शिक्षार्थी उचित समाधानों के बारे में जानेंगे और अपशिष्ट प्रबंधन क्षेत्र में अपनी सेवाओं को प्रस्तुत करेंगे।

कार्यक्रम का उद्देश्य

ठोस अपशिष्ट प्रबंधन कार्यक्रम में प्रमाण पत्र के समग्र उद्देश्य हैं:

- अपशिष्ट उत्पादन की समस्या और पर्यावरण और मानव स्वास्थ्य पर इसके प्रभाव के बारे में शिक्षार्थियों को जागरूक करना।
- देश में अपशिष्ट प्रबंधन के बारे में मौजूदा कानून, ज्ञान और प्रथाओं से शिक्षार्थियों को परिचित कराना।
- ठोस अपशिष्ट को प्रभावी ढंग से प्रबंधित करने की क्षमता के साथ शिक्षार्थियों को तैयार करना

सीखने वाले की विशेषता

कार्यक्रम के सफल समापन पर,

- अनुशासनात्मक ज्ञान और कौशल: अपशिष्ट उत्पादन की समस्या और इसके पर्यावरणीय प्रभाव के बारे में ज्ञान का प्रदर्शन करने में सक्षम।
- कुशल संचारक: उपलब्ध उपयोग करने की क्षमता कुछ उपयोगी संसाधन में कचरे को परिवर्तित करने के लिए।
- महत्वपूर्ण विचारक और समस्या समाधानकर्ता: बड़े पैमाने पर समुदाय, पड़ोस और समाज के बीच अर्जित ज्ञान को साझा करने की क्षमता।
- जांच की भावना: बाहरी क्षेत्र के स्थानों में काम करने में सक्षम।
- टीम के खिलाड़ी / कार्यकर्ता: अपशिष्ट उत्पादन और नवीन समाधानों को तैयार करने के मुद्दों पर गंभीर रूप से सोचने में सक्षम।
- कुशल परियोजना प्रबंधक: स्रोत स्तर पर अपशिष्ट प्रबंधन को अंजाम देने के लिए आत्म पुस्तक और स्वयं निर्देशित सीखने की क्षमता।
- नैतिक जागरूकता / तर्क: कार्यक्रम का मूल आधार नैतिकता का सिद्धांत है।
- आजीवन सीखने वाले: विभिन्न स्तरों पर सतत विकास प्राप्त करने में समकालीन वैश्विक मुद्दों पर अपने ज्ञान को बढ़ाने और सुधारने के उद्देश्य से स्व-निर्देशित सीखने में सक्षम।

योग्यता विवरणक

सॉलिड वेस्ट मैनेजमेंट प्रोग्राम में सर्टिफिकेट के लिए योग्यता विवरणक निम्नलिखित शामिल हो सकते हैं

पर्यावरण विज्ञान के मौजूदा उभरते मुद्दों और इसकी विभिन्न समस्याओं की बुनियादी समझ को प्रदर्शित करता है विशेष रूप से अपशिष्ट उत्पादन

- समाज के लिए ज्ञान का संचार
- वास्तविक जीवन स्थितियों में किसी के ज्ञान को लागू करें और उसके अनुसार कार्य करें।
- विभिन्न प्रकार के कचरे और इसके प्रबंधन के बारे में व्यापक ज्ञान का प्रदर्शन

कार्यक्रम सीखना उद्देश्य

अपेक्षित सीखने के परिणाम :

- कार्यक्रम स्वतंत्र अपशिष्ट प्रबंधन प्रक्रियाओं को पूरा करने की क्षमता विकसित करने के लिए आवश्यक साधन के साथ शिक्षार्थियों को प्रदान करेगा।
- शिक्षार्थी विभिन्न प्रकार के कचरे का विश्लेषण और पृथक्करण करना जानते हैं और स्थानीय परिस्थितियों के अनुसार समाधान का प्रस्ताव करने में सक्षम होंगे।
- इस कार्यक्रम को करने से जागरूकता का विस्तार होगा, उद्यमशीलता बढ़ेगी और अपशिष्ट प्रबंधन उद्योगों में लाभकारी रोजगार को समझने और खोजने के लिए एक आधार मिलेगा।
- प्रस्तावित कार्यक्रम के शिक्षार्थी उद्योगों, अनुसंधान और विकास संगठनों, गैर सरकारी संगठनों, विकास परियोजनाओं आदि में एक रचनात्मक भूमिका निभाएंगे।

पाठ्यक्रम स्तर के सीखने के परिणाम

सीएसडब्ल्यूएम कार्यक्रम के भीतर पाठ्यक्रमों से संबंधित पाठ्यक्रम-स्तर के सीखने के परिणामों को निश्चित रूप से इंगित किया गया है:

पाठ्यक्रम 1: ठोस अपशिष्ट का परिचय

- ठोस अपशिष्ट के मुद्दे से परिचित होना
- ठोस कचरे को परिभाषित करें
- ठोस अपशिष्ट उत्पादन के कारणों और प्रभावों के बारे में बताएं।
- अपशिष्ट अलगाव के महत्व को समझाएं
- अपशिष्ट प्रबंधन में अनौपचारिक श्रमिकों के महत्व को पहचानें

पाठ्यक्रम 2: नगरपालिका, कृषि, औद्योगिक व परिसंकटमय अपशिष्ट प्रबंधन

- नगरपालिका, कृषि, औद्योगिक और खतरनाक अपशिष्ट की विशेषताओं और प्रकृति का वर्णन करें।
- नगरपालिका, कृषि, औद्योगिक और खतरनाक अपशिष्ट के प्रभावी प्रबंधन में जान लागू करें।
- बायोकेम्पोस्टिंग और वर्मीकम्पोस्टिंग को प्रोत्साहित करें
- बागवानी, डेयरी और जलीय कृषि अपशिष्ट के प्रबंधन के लिए समाधान तैयार करें
- खतरनाक कचरे के प्रभाव को कम करने के लिए • समाधान तैयार करें

पाठ्यक्रम 3 : प्लास्टिक, इलेक्ट्रॉनिक, जैव चिकित्सा व निर्माण व विध्वंस अपशिष्ट प्रबंधन

- प्लास्टिक, इलेक्ट्रॉनिक, बायोमेडिकल और निर्माण और विध्वंस अपशिष्ट की विशेषताओं और प्रकृति का वर्णन करें
- थर्मोसेटिंग और थर्मोप्लास्टिक के बीच अंतर।
- विभिन्न प्रकार के बायोमेडिकल कचरे के बीच अंतर
- उन विकल्पों की सूची बनाएं जिनका उपयोग प्लास्टिक के स्थान पर किया जा सकता है
- पर्यावरण और मानव स्वास्थ्य पर प्लास्टिक, इलेक्ट्रॉनिक, बायोमेडिकल और निर्माण और विध्वंस अपशिष्ट के प्रभाव को समझाने के लिए
- कचरे को कम करने के लिए कंपनियों की ईपीआर और अन्य योजनाओं के महत्व को पहचानें

शिक्षण-प्रक्रियाएँ

अपशिष्ट उत्पादन और इसके प्रभावों के प्रति संवेदनशीलता का विकास शिक्षण अधिगम प्रक्रिया के एक महत्वपूर्ण पहलू का गठन करेगा। शिक्षार्थियों को उनके स्वास्थ्य और समग्र कल्याण पर अनुचित अपशिष्ट प्रबंधन के हानिकारक प्रभावों के बारे में सूचित किया जाएगा। कार्यक्रम के उद्देश्यों को प्राप्त करने के लिए व्याख्यान, परामर्श, इंटरैक्टिव रेडियो काउंसलिंग, टेलीकांफ्रेंसिंग सहित शिक्षण सीखने की प्रक्रिया के लिए विभिन्न तरीकों का आयोजन किया जाएगा। समस्या को सुलझाने के कौशल और उच्च क्रम सोच कौशल के कारण ऑडियो और वीडियो कार्यक्रमों के माध्यम से विचार-विमर्श और विचारों को साझा करने के माध्यम से प्रोत्साहित किया जाएगा

- लर्निंग पैकेज: मुद्रित स्व अध्ययन सामग्री को छात्र को भेजा जाएगा।
- परामर्श: अध्ययन केंद्र समन्वयक द्वारा निर्धारित कार्यक्रम के अनुसार परामर्श सत्र आयोजित किए जाएंगे। शिक्षार्थियों की सुविधा के लिए सप्ताहांत के दौरान ऐसे सत्रों की व्यवस्था की जाएगी।
- वेब काउंसलिंग: समय-समय पर इग्नू के उपलब्ध ऑनलाइन प्लेटफॉर्म के माध्यम से संबंधित क्षेत्रों में वेब आधारित परामर्श सत्रों की भी व्यवस्था की जाएगी।

मूल्यांकन प्रक्रिया

पाठ में आपके प्रगति अभ्यासों की जाँच के रूप में औपचारिक मूल्यांकन किया जाएगा। शिक्षार्थियों को आभासी मामलों और समस्या आधारित असाइनमेंट प्रदान किए जाएंगे और उनसे अपशिष्ट प्रबंधन पर अपने ज्ञान का प्रदर्शन करने के लिए कहा जाएगा। अंत में, विभिन्न विषयों के बारे में उनकी समझ के बारे में जानने के लिए टर्म एंड परीक्षा आयोजित की जाएगी। प्रत्येक पाठ्यक्रम के लिए असाइनमेंट प्रोजेक्ट्स और केस स्टडी रिपोर्ट पर आधारित होगा। शिक्षार्थियों को स्थिति का विश्लेषण करने और अपनी राय व्यक्त करने के लिए बनाया जाएगा।

सतत मूल्यांकन (30%)

टर्म एंड परीक्षा (70%)

7. CERTIFICATE IN PERFORMING ARTS – KARNATAK MUSIC(CPAKM)*

Dr. Mallika Banerjee, (Programme Coordinator, CPAKM)
SOPVA

1. Introduction

Music – a magical word which contains an entire universe in its total self. Philosophically it is accepted that Music existed even before the birth of human beings, the Music of the Universe or Cosmos precedes the man-made music.

However, during the developmental stage of mankind, humans became aware of the magical and mystical power of intonated sound or what we call it as music today. Thus accepting the power of music man chose it as a medium to communicate with God and gradually music became a powerful medium to convey feelings like joy, love, sorrow, victory, hope, anger, defeat etc. among fellow human beings too.

As humankind developed and established its societal existence, among many other things it also started developing music according to their understanding, evolving around their respective languages, cultures and ways of life. Thus, like in all other countries, in India too music took a distinct shape with distinct characteristics. The term used for music in India is ‘Sangeeta’ and its melodious existence has become all-pervading in day-to-day life in Indian Society.

The Certificate programme in Karnatak Music intends to provide a basic knowledge of genesis of music and historical development of music in India, Basic Theoretical knowledge of Karnatak Music and Basic skill of singing Karnatak Music.

2. Nature and Scope of the Certificate in Performing Arts- Karnatak Music programme

From learner’s point of view the main attraction to join a study programme in music is aimed to acquire skills to perform music. Keeping that in view the programme has been designed to provide practical training to the learners. The programme is a 16 credit programme comprising of 4 credits of Theory and 12 credits of Practical component. The duration of the programme is 6 months.

3. Aims of the CPAKM programme

Certificate of Performing Arts – Karnatak Music aims to provide to the Karnatak classical music education to the discerning students who do not have access to study it through conventional system. This course has been designed for serious Karnatak Music students to get knowledge of the subject theoretically as well as practically, which will facilitate the students to take up further studies in Karnatak Music.

**Programme under revision – to be launched shortly*

4. Characteristic attributes of a graduate in CPAKM

Some of the characteristic attributes of a graduate in CPAKM may include the following:

1. Should acquire Disciplinary knowledge and skills of singing prescribed Ragas and Forms
2. Should be able to render prescribed songs skillfully.
3. Should be able to understand theories of Karnatak Music and should develop sense of inquiry to delve deep into the theoretical aspect to enhance one's understanding of Karnatak Music.

5. Qualification descriptors for CPAKM programme

The qualification descriptors for CPAKM programme may include the following:

- Demonstrate coherent understanding of theory and Practical of Karnatak Music through their rendition.
- Explain the evolution of Karnatak Music and its relation with the ancient Tamil Music and Ancient Indian Music.
- Apply and demonstrate the theoretical knowledge in their rendition of practical component.

6. Programme learning outcomes relating to CPAKM programme

After completing the programme students should be able to

- State and define common terms of Karnatak Music
- Identify, distinguish and demonstrate the names of different pitches and notes.
- Skillfully render prescribed Ragas and musical forms.
- Describe outline History of evolution of Karnatak Music.

7. Course-level learning outcomes

Course-level learning outcomes relating to courses within CPAKM programme are indicated course wise:

Course 1. Introduction to Karnatak Music and its Fundamentals

- State and define common terms of Karnatak Music
- Describe outline History of evolution of Karnatak Music.
- Comprehend the evolution of Karnatak Music from earlier to its present form
- Outline the changes happened in the 14th century in the existing system of Karnatak Music
- be able to explain the changes came in Karnatak Music after the advent of Melakarta System in 17th Century

8. Teaching-learning processes

The theory component of 4 credits will be taught in 5 session of Theory Counseling (one counselling sessions of 2.5 Hrs.

Counselling of Practical component of 12 credits will be through 45 Practical sessions of 4 hrs and 180 hrs of Audio and Video recordings

9. Assessment methods

The evaluation will be through internal assessment exam and Term end exam in Practical, where as in theory evaluation will be through one assignment and one Term end examination. Internal assessment examination of practical component will be conducted by the academic councilors at the Programme study centre. Final examination of practical should be conducted by one external and one internal examiner. In preparation of final result weightage of internal assessment will be 30% and TEE will be of 70%.

ANNEXURES

Indira Gandhi National Open University (IGNOU)

Staff Training & Research Institute of Distance Education (STRIDE)

Faculty Development Programme on Learning Outcomes based Curriculum Framework

Date: 24-30 September, 2019

About The Workshop

STRIDE is the specialized Institute for imparting training and research and has been conducting various training and research programmes from time to time. These programmes range on different topics depending upon the needs of the various ODL personnel. As per the UGC regulations, all faculty in universities have to undergo regular training to expand their knowledge base as well as develop new competencies in different areas. One such area that has been identified is that of Learning Outcomes – The frame work of all curriculum has to be designed and developed so that every course has a quantitative and qualitative matrix as its foundation as well as its outcome. It is also a requirement that all institutions seeking accreditation from NAAC should be able to demonstrate Graduate Attributes/ Programme Outcome for their courses.

In view of this requirement, STRIDE conducted a Faculty Development Programme on Learning Outcomes based Curriculum Framework.

Objectives

The objective of this workshop is to provide training for developing knowledge and skills for understanding the concept of learning outcomes as well as formulating LOs in the curriculum framework.

Participants

The participants were programme coordinators of UG and PG courses of IGNOU from various Schools from IGNOU headquarter. The tentative number of participants was 27.

Date 24-30 September, 2019

The workshop was conducted for (07) days from 24-30 September, 2019. The programme started at 09:30 AM and concluded at 5:15 PM.

Venue

The venue was Conference Room, Dr. S. Radhakrishnan Block, Block 17, Head Quarters, IGNOU, Maidan Garhi, New Delhi.

Programme Schedule

The workshop had 4 sessions of 1hr. 30 minutes each.

Resource Persons

The Resource persons for this FDP would include faculty from IGNOU as well as External Experts, who would be from national institutions. The Resource Persons included experts from Delhi University, NCERT, as well as other eminent persons in the area of education.

The external resource persons proposed are as follows:

- (i) Prof. Murari Suvedi, Michigan State University
- (ii) Prof. Pankaj Arora, CIE, Delhi University
- (iii) Prof. Sharad Sinha, NCERT
- (iv) Prof. Veerpal Singh, NCERT

Programme Methodology

The workshop methodology included interactive sessions with Resource Persons, presentations as well as hands on practice for developing Learning Outcomes for different curriculum areas.

Expected Outcomes

It was expected that this workshop will enhance the understanding of Curriculum Outcomes and develop a Curriculum Outcomes based Curriculum Framework. It would enable faculty to apply the knowledge and skills gained in this FDP to the development of Curriculum, Course Materials and Evaluation Materials in their respective programmes.

Workshop Coordinators

The Workshop Coordinators were Dr. Anita Priyadarshini, Associate Professor, STRIDE and Prof. Manjulika Srivastava, Director, CIQA

Indira Gandhi National Open University
Staff Training and Research Institute of Distance Education
Faculty Development Programme on Learning Outcomes based Curriculum Framework
Date: 24-30 September, 2019, Venue: Dr. S. Radhakrishnan Block, IGNOU
Programme Schedule

Day & Date	10:00 - 11:30 hrs.	11:30-11:45	11:45 - 13:15 hrs.	13:15 - 14:00	14:00 - 15:30 hrs.	15:30-15:45	15:45 – 17:15 hrs.
Day 1 24/09/19 Tuesday	10:00 – 10:30 Inauguration	T E A B R E A K	S2: About the LOCF : UGC Guidelines Discussion on LOCF document for ODL Programmes (<i>Prof. Manjulika Srivastava & Dr. Anita Priyadarshini</i>)	L U N C H B R E A K	S3: Learning Outcomes in the Curriculum – The NCERT Experience (<i>Prof. Sharad Sinha, NCERT</i>)	T E A B R E A K	S4: Developing the Learning Outcomes for IGNOU programme (<i>Dr. Anita Priyadarshini</i>)
	S1 About the Workshop & Expected Outcomes (<i>Prof. Manjulika Srivastava & Dr. Anita Priyadarshini</i>)		S6 Developing Curriculum with Learning Outcomes (<i>Prof. Murari Suvedi, Michigan State University, USA</i>)		S7: Learning outcomes for CBCS (<i>Prof. Pankaj Arora, CIE, Delhi University</i>)		S8 Learning outcomes for CBCS In different disciplines (<i>Prof. Pankaj Arora, CIE, Delhi University</i>)
Day 2 25/09/19 Wednesday	S5: Learning Outcomes - Theoretical Framework (<i>Prof. N.K. Dash, SOE</i>)		S10: Developing Agricultural Extension Curriculum with Learning Outcomes (Experience Sharing) (<i>Prof. P.V.K. Sasidhar</i>)		S11: Designing learning outcomes for Social Sciences and Vocational Courses. (<i>Prof. Debal K. SinghaRoy & Dr. RSP Singh</i>)		S12: Designing learning outcomes for Sciences and Computer Sciences (<i>Prof. S.R. Jha & Sh. Akshay Kumar</i>)
Day 3 26/09/19 Thursday	S9: Designing the Learning Outcomes Document (<i>Dr. Anita Priyadarshini</i>)		S14 Preparing Learning Outcomes (Group Activity) (<i>Dr. Anita Priyadarshini & Dr. Ali Asgar</i>)		S15: Presentation of Group Activity (<i>Prof. N.K. Dash & Dr. Anita Priyadarshini</i>)		S16: Presentation of Group Activity (<i>Prof. R. Satyanarayana & Dr. Anita Priyadarshini</i>)
Day 4 27/09/19 Friday	S13: Preparing Learning Outcomes (Group Activity) (<i>Prof. Basanti Pradhan & Mr. Tata Ramakrishna</i>)		S18: Learning Outcomes and Performance Assessment (<i>Prof. Veerpal Singh, NCERT</i>)		S19: Draft LOCF Document for IGNOU: Discussion (<i>Dr. Anita Priyadarshini</i>)		S20: 15.45 – 16.30 Draft LOCF document: Preparing the work plan (<i>Dr. Anita Priyadarshini</i>)
Day 5 30/09/19 Monday	S17: Developing a Learning Outcomes based Question Paper (<i>Dr. Anita Priyadarshini</i>)				16.30 to 17.15 Valediction		

Workshop Coordinators: Dr. Anita Priyadarshini, Associate Professor in Distance Education, STRIDE and Prof. Manjulika `Srivastava, Director, CIQA

**IGNOU
STRIDE
Faculty Development Programme on Learning Outcomes Based Curriculum Framework
24-30 September, 2019**

List of Participants

S. No.	Name	Designation	School
1.	Prof. R.P. Singh	Professor	SOCE
2.	Prof. Parmod Kumar	Professor	SOH
3.	Prof. Lalita S. Kumar	Professor	SOS
4.	Dr. Benidhar Deshmukh	Associate Professor	SOS
5.	Dr. Manish Trivedi	Associate Professor	SOS
6.	Dr. S. Venkataraman	Associate Professor	SOS
7.	Dr. Sanjay Agarawal	Associate Professor	SOET
8.	Dr. Elizabeth Kuruvilla	Assistant Professor	SOE
9.	Sh. C. Ajith Kumar	Assistant Professor	SOE
10.	Dr. Geetika S. Johry	Assistant Professor	SOVET
11.	Ms. Asha Yadav	Assistant Professor	SOVET
12.	Dr. Ramesh Yadav	Assistant Professor	SOJNMS
13.	Dr. Shikha Rai	Assistant Professor	SOJNMS
14.	Mr. Shivaji Bhaskar	Assistant Professor	SOFL
15.	Dr. Deeksha Dave	Assistant Professor	SOITS
16.	Dr. YSC Khuman	Assistant Professor	SOITS
17.	Dr. (Mohd.) Tahir Siddiqui	Assistant Professor	SOPVA
18.	Dr. Mallika Banerjee	Assistant Professor	SOPVA
19.	Dr. Sunita Dhal	Assistant Professor	SOGDS
20.	Dr. Sudhansh Sharma	Assistant Professor	SOCIS
21.	Dr. Pulla Lakshmi	Assistant Professor	STRIDE
22.	Dr. Kiranmayi Bhushi	Associate professor	SOSS
23.	Dr. Saugato Sen	Associate professor	SOSS
24.	Dr. Z. Yanthan	Assistant Professor	SOSS
25.	Dr. Rukshana Zaman	Assistant Professor	SOSS
26.	Dr. Mitoo Das	Assistant Professor	SOSS
27.	Dr. Biplab Jamatia	Assistant Professor	SOHS

Template developed by IGNOU for
Learning Outcomes Curriculum Framework

Chapter ____

_____ PROGRAMME

1. Introduction

2. Nature and Scope of the _____ programme

3. Aims of the _____ programme

4. Characteristic attributes of a graduate in _____

Some of the characteristic attributes of a graduate in _____ may include the following:

Disciplinary knowledge and skills:

Skilled communicator:

Critical thinker and problem solver:

Sense of inquiry:

Team player/worker:

Skilled project manager:

Digitally literate:

Ethical awareness/reasoning:

Lifelong learners:

5. Qualification descriptors for _____ programme

6. Programme learning outcomes relating to _____ programme

7. Course-level learning outcomes

Course-level learning outcomes relating to courses within _____ programme are indicated course wise:

8. Teaching-learning processes

9. Assessment methods