



Janardan Bhagat Shikshan Prasarak Sanstha's

**CHANGU KANA THAKUR
ARTS, COMMERCE & SCIENCE COLLEGE, NEW
PANVEL (AUTONOMOUS)**

Re-accredited 'A+' Grade by NAAC

'College with Potential for Excellence' Status Awarded by UGC

'Best College Award' by University of Mumbai

**Program: Post-Graduate Diploma in
Analytical Instrumentation**

Total Credits: 20

SYLLABUS

(Approved in the Academic council meeting held on-----)

**Post-Graduate Diploma in
Analytical Instrumentation**

as per

Choice Based Credit & Grading System (60:40)

w. e. f. Academic Year 2022-23

Preface

Post Graduate Diploma in Advanced Analytical Instrumentation Programme is offered by Changu Kana Thakur Arts, Commerce and Science College, New Panvel is the initiative towards the “Skill India” and “Make in India” campaign by Hon. Prime Minister Narendra Modi. This programme is designed to cater the needs of the qualified trained analytical personnel working in Industries, laboratories, R & D centres and academic institutions. Specifically, it is useful for all the science graduates of our institute and the other institutes aspiring to get employment in industries and pursuing research as well. The chemists working in the industry need to be academically revitalised for total quality management, good laboratory practices and modern analytical instrumentation. The course will bridge the gaps and differences between industry and academic institutions. As the course is based on practical aspects of analysis including handling of highly sophisticated analytical instruments it would be able to accomplish all these targets envisaged.

The participants of this course will have knowledge sample testing, laboratory management, analysis methods, record keeping, technical writing and related activities. They will have job opportunities in Quality control, Quality assurance and R & D, Analytical Development departments / sections in the industries and onsite labs. Those who are already working in these areas will be benefitted by the programme in terms of career enhancement and growth within the organisation or at the time of switching their organisations.

Course Details

+ **Course type** : P G Diploma course

+ **Course Title** : Post Graduate Diploma in Advanced Analytical Instrumentation

+ **Course Objectives:**

- To Provide thorough knowledge and hands- on experience of highly sophisticated analytical instruments and laboratory techniques
- To familiarize the students with Quality control processes, GMP, GLP etc.
- To provide Practice based learning and improvements.
- To train the students with skills, that can meet the requirements of industry.

+ **Course Outcomes**

After completing the program, students will be able to

- Prepare solutions of various strength, reagents used for Instrumental analysis.
- Analyze real sample on sophisticated analytical instruments using SOPs.
- Demonstrate handling of troubleshooting abilities on the instruments during actual analysis.
- Interpret chromatographic and spectroscopic analytical data.

+ **Eligibility:** B.Sc. in the discipline of Chemistry; Microbiology; Biotechnology, Candidates appearing for the final year of Bachelor's degree or awaiting their results, are also eligible.

+ **Intake capacity:** 20

+ **Duration:** 1 Y

+ **Fees:** Rs. 20000/-

+ **Course coordinator:**

Email:

+ **Career opportunities:** Quality control, Quality assurance and R&D/Analytical Development departments/sections of food, pharma API/Formulation Mfg, chemical industries and onsite labs. Those who are already working in these areas will be benefitted by the programme in terms of career enhancement and growth within the organisation or at the time of switching their organisations.

 COURSE STRUCTURE:

SEMESTER I					
Course	Course Name	Contact hrs.	Marks allotted		Credits allotted
			CIE	final	
Course1	Fundamentals of Chemical and Pharmaceutical analysis	30	40	60	02
Course 2	Advanced Spectroscopic Techniques	30	40	60	02
Laboratory 1	Practical in Spectroscopic techniques	30	50		02
Laboratory 2	Spectral analysis and Interpretation of data	30	50		02
Project	Dissertation	30	50		02
Total			350		10
SEMESTER II					
Course	Course Name	Contact hrs.	Marks allotted		Credits allocated
			CIA	Final	
Course1	Quality Management system, sample management and safety in industry	30	40	60	02
Course 2	Advanced Chromatographic techniques	30	40	60	02
Laboratory 1	Practical in chromatographic techniques	30	50		02
Laboratory 2	Practical in method development and method validation	30	50		02
Industrial Training (1 to 3 months) (Report)		30	50		02
Total			350		10

SYLLABUS

SEMESTER I

Course I : Basic Understanding of Chemical and Pharmaceutical analysis

Course No.	Course name	Course code
I	Basic Understanding of Chemical and Pharmaceutical analysis	PDAI1BCP
Module	Description	Teaching hours
	<ul style="list-style-type: none">The foundation module is designed to provide a background in analytical techniques and introduce new concepts in Quality Control and Statistics.A crucial component of the foundation module is the introduction of Industrial Ethics and Law, which prepares students for dealing with Industrial Regulatory issues and compliance.	
1.1	Basic Understanding of Chemical and Pharmaceutical analysis	03
1.2	Evaluation of Method of Analysis, Pharmacopoeias Monographs, Routine Testing, and Verification studies, Method Development and Method Validation. - ICH guidelines for Analytical Method Validation Q2A	08
1.3	- Specialized Analytical Techniques: Karl Fischer Titrator, digital M.P./B.P. meter, Kjeldahl apparatus.	04

Course II : Advanced Spectroscopic Techniques

Course No.	Course name	Course code
II	Advanced Spectroscopic techniques	PDAI1AST
Module	description	Teaching hours
2.1	Spectroscopic Methods	
	<ul style="list-style-type: none">UV-VIS spectroscopy,FTIR spectroscopy,	15

	<ul style="list-style-type: none"> - Flame photometry - Atomic absorption spectroscopy - Mass Spectroscopy 	
	<ul style="list-style-type: none"> - Principle behind Spectroscopy. - Operation, Cleaning and Calibration of Spectroscopy Instruments. - Safety Measurements - Maintenance of instruments 	

Laboratory1

Course No.	Course name	Course code
III	Practical in Spectroscopic techniques	PDAI1PST
Module	description	Teaching hours
Practical Training will be provided in Analytical Techniques, Project based Techniques, Utilization of wide range of Lab Instrumentation including Spectroscopy and Chromatography.		
2.1	<ol style="list-style-type: none"> 1 . Determination of Paracetamol Tablet by UV-visible spectrophotometry 2 . Determination of Metformin hydrochloride tablet by UV-visible Spectrophotometry 3 . Recording of the UV Scan of the Ibuprofen compound by UV Spectrophotometry 4 . Determination of P₂O₅ content in given sample of phosphatic fertilizers. 5 . Study of the FT-IR spectrum of Salicylic acid on FT-IR Spectrophotometer. 6 . Study of the FT-IR spectrum of caffeine by FT-IR spectrophotometer. 7 . Determination of Copper content in given water sample by AAS 8 . Determination of Calcium in milk sample 	30

Laboratory 2

Course No.	Course name	Course code
IV	Practical in Spectral analysis and Interpretation of Data	PDAI1PSI
Module	description	Teaching hours
Practical Training will be provided in spectral analysis and interpretation of spectral data.		
2.1	1. Spectral analysis and Interpretation of Spectral Data	30

SEMESTER II

Course I : Quality Management system, sample management and safety in industry

Course No.	Course name	Course code
I	Quality Management system, sample management and safety in industry	PDAI2QMS
Module	Description	Teaching hours
<ul style="list-style-type: none"> • The foundation module is designed to provide a background in analytical techniques and introduce new concepts in Quality Control and Statistics. • A crucial component of the foundation module is the introduction of Industrial Ethics and Law, which prepares students for dealing with Industrial Regulatory issues and compliance. 		
1.1	Quality Management System- <ul style="list-style-type: none"> - Quality Assurance, - Documentation- SOPs, Manuals, Log Books, - Test Reporting - Graphs/ Spectra/ Chromatographs, Raw data interpretation. 	
1.1	Sample Management <ul style="list-style-type: none"> - Guidelines for maintenance for reference standards and working standards 	

	<ul style="list-style-type: none"> - Flow - Storage - Destruction 	
1.3	<p>Understanding Basic Safety Rules</p> <ul style="list-style-type: none"> - Use of Primary Protective Equipment - Environment, Safety & Hazard - Importance of Good Laboratory Practices (GLP) while working in the Laboratory. 	

Course II : Advanced Chromatographic techniques

Module	description	Teaching hours
Practical Training will be provided in Analytical Techniques, Project based Techniques, Utilization of wide range of Lab Instrumentation including Spectroscopy and Chromatography.		
2.1	Chromatography Methods	
	<ul style="list-style-type: none"> - Gas chromatography, - High performance liquid chromatography, - High Performance Thin Layer Chromatography 	15
	<ul style="list-style-type: none"> - Principle behind Chromatography. - Operation, Cleaning and Calibration of Chromatographic Instruments. - Safety Measurements - Theoretical knowledge of IQ/OQ/PQ of Instrument - Maintenance of instruments 	

Laboratory 1

Course No.	Course name	Course code
III	Practical in chromatographic techniques	PDAI2PST

Module	description	Teaching hours
Practical Training will be provided in Analytical Techniques, Project based Techniques, Utilization of wide range of Lab Instrumentation including Spectroscopy and Chromatography.		
	<ol style="list-style-type: none"> 1 . Separation of mixture of Benzene & Toluene by GC and study of chromatogram 2 . Determination of percentage purity of Methyl Alcohol using GC 3 . Assay of methyl paraben using HPLC 4 . Determination of alcohol in beer sample by using GC 5 . Estimation of nitrogen from given fertilizer by Kjeldahl method 6 . Moisture content in pharmaceutical/food sample by Karl Fischer titration method 7 . Calibration of Gas chromatography 8 . Assay of Vitamin D3 by HPLC 	30

Practical 2

Course No. IV	Course name Method validation	Course code PDAI2PSI
Module	description	Teaching hours
Practical Training will be provided in spectral analysis and interpretation of spectral data.		
2.1	<ol style="list-style-type: none"> 1 . Preparation of Mobile Phase for HPLC.& Preparation of Std Caffeine Sol'n 2 . Determination of System Precision Test for Caffeine 3 . To determine the linearity of a given solvent or mixture of solvents 4 . Study to develop analytical method for determination of assay of pharmaceutical API by UV spectrophotometry 5 . Determine the precision of chloroquine phosphate by using UV spectrophotometry 	30

Industrial Visit: One industrial visit is mandatory (Pharma industry(API & Formulations), Speciality Chemicals/Pesticide/Fertilizers effluent treatmentplant, forensic lab.): 6 Hrs

per visit

Industrial training: Students will send to industry for actual industrial training at least for 1 to 3 months, i.e. total 30 To 90 days.

- Students have to prepare a brief report on industrial visit with inputs from industrial personnel. The report will be assessed for internal evaluation

Reference Books

1. Inorganic quantitative analysis by Vogel.
2. Practical HPLC analysis by Veronica Meyer
3. Instrumental methods of Analysis by Skoog, Holler and Nieman.