



**CSIR-National Chemical Laboratory**

**Dr Homi Bhabha Road, Pune**

**CSIR's Skill Development Initiative**



**1. Gas Chromatography (GC), Gas Chromatography-Mass Spectrometry (GC-MS), High Performance Liquid Chromatography (HPLC) and Liquid Chromatography-Mass Spectrometry (LC-MS) (13<sup>th</sup> August to 31<sup>st</sup> August 2018)**

**course code: SDP\_NCL01**

This course includes GC, GC-MS, HPLC and LC-MS techniques. These techniques are very much useful in industries as well as academics research. They are powerful techniques for the identification and characterization of organic compounds, bio-molecules, agricultural fertilizers, industrial gaseous samples as well as impurity profiling, etc. This course deals with basics to various applications such as reaction monitorization, headspace sample analysis, qualitative and quantitative analysis.

Title	: Training on GC, GC-MS, HPLC and LC-MS techniques
Duration	: 3 weeks
No. of Seats	: 10-12
Educational Qualification	: B. Sc., B. Pharm., M. Sc., M. Pharm.
Medium of instruction	: English
Venue of the course	: CSIR-National Chemical Laboratory, Pune
Course Fee	: For Indian Nationals: Rs. 10,000/- (Student), Rs. 20,000/- (Faculty) Rs. 25,000/- (Industry Sponsored Candidate) For Foreign Nationals: US \$3000

For foreign national course fee include training fees, expenses towards boarding & lodging of the participants, local transportation costs, other associated expenses and institute overheads whereas for the Indian national the course fee include training fees, lunch and breakfast and institute overheads. Accommodation to the Indian National will be provided in NCL at nominal charges.

Course Coordinators	Dr. Mrs. B. Santhakumari ( <a href="mailto:b.santhakumari@ncl.res.in">b.santhakumari@ncl.res.in</a> ) Dr. Sanjay Borikar ( <a href="mailto:sp.borikar@ncl.res.in">sp.borikar@ncl.res.in</a> ) Dr. Savita Shingote ( <a href="mailto:sk.shingote@ncl.res.in">sk.shingote@ncl.res.in</a> ) Dr. Dr. Sunil Bhongale ( <a href="mailto:ss.bhongale@ncl.res.in">ss.bhongale@ncl.res.in</a> ) Mr. D. L. Sadafule ( <a href="mailto:dl.sadafule@ncl.res.in">dl.sadafule@ncl.res.in</a> )
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## 2. Basic to advanced training in Mass Spectrometry based Proteomics

(23<sup>rd</sup> July to 10<sup>th</sup> August 2018)

course code: SDP\_NCL 02

Mass spectrometry has become powerful tool in the area of proteomics mainly due to the advancement in ionization techniques like Electrospray ionization and MALDI, as well as due to the improvement in the accuracy and resolution of the analyzers such as Time of Flight (TOF) and Orbitrap. In this workshop/course, we will discuss the basics of mass spectrometry including ionization, analyzers, sample preparation procedures, SDS-PAGE, Western Blot, MALDI-TOF Mass Spectrometry and different types of acquisitions, applications of mass spectrometry in determination of molecular mass of peptides and proteins, peptide mass finger printing, peptide sequencing, post translational modification and quantitative proteomics.

Title	Training workshop in mass spectrometry based proteomics
Duration	: 3 weeks (15 training days)
No. of Seats	: 15
Educational Qualification	: Masters in Science or equivalent (completed/ pursuing final year) with basic knowledge in protein chemistry and mass spectrometry
Medium of instruction	: English
Venue of the course	: CSIR-National Chemical Laboratory, Pune
Course Fee	: For Indian Nationals: Rs. 10,000/- (Student), Rs. 20,000/- (Faculty) Rs. 25,000/- (Industry Sponsored Candidate) For Foreign Nationals: US \$3000

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Course Coordinators	Dr. Mahesh Kulkarni ( <a href="mailto:mj.kulkarni@ncl.res.in">mj.kulkarni@ncl.res.in</a> ) Dr. Mrs. B. Santhakumari ( <a href="mailto:b.santhakumari@ncl.res.in">b.santhakumari@ncl.res.in</a> )
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### 3. **Basic to advanced techniques in industrial microbiology**

(22<sup>nd</sup> November to 11<sup>th</sup> December 2018)

course code: SDP\_NCL03

National Collection of Industrial Microorganisms (NCIM) provides an extensive documentation and detailed identification information on the biological materials. The diversity and quality management of its bioresources render the NCIM an internationally known supplier for science, pharmaceutical laboratories, national reference centers, as well as industrial partners. The research of the NCIM focuses on microbial diversity, ecology and the underlying evolutionary mechanisms (genome evolution, metagenomics), improved methods for the access and ex situ preservation of biodiversity and, molecular mechanisms of biological interactions. NCIM has the specific expertise and offers counseling in the areas like taxonomy, phylogeny and species description, genomics and transcriptomics, Standardization and quality assurance of bioresources, and multifaceted biotechnological exploitation of microbial resources. For any microbial technology, it is very important to understand their biochemical performance, identity and commercial potential for value added product using targeted isolation, characterization using phenotypic and genotypic tools, fermentation and analytical techniques. Biotechnological applications include biomass waste to wealth, probiotics, natural products, agriculturally important microorganisms, biofuel producing strains, algae nutraceuticals, and thermophiles and so on.

Title	:	Techniques in isolation, characterization and preservation of industrially important microorganisms
Duration	:	3 Weeks (15 training days)
No. of Seats	:	10
Educational Qualification	:	Basic knowledge in Microbiology
Medium of instruction	:	English
Venue of the course	:	CSIR-National Chemical Laboratory, Pune
Course Fee	:	For Indian Nationals: Rs. 10,000/- (Student), Rs. 20,000/- (Faculty), Rs. 25,000/- (Industry Sponsored Candidate) For Foreign Nationals: US \$3000.

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Course Coordinators : Dr. Mahesh Dharne ([ms.dharne@ncl.res.in](mailto:ms.dharne@ncl.res.in))  
Dr. Syed Dastager ([sq.dastager@ncl.res.in](mailto:sq.dastager@ncl.res.in))

#### 4. Cheminformatics Theory and Practice (23<sup>rd</sup> July to 10<sup>th</sup> August 2018)

course code: SDP\_NCL04

Cheminformatics is equipped to impact our life in a big way mainly in the fields of chemical, medical and material sciences. This certificate course is a product of several years of experience and passion for the subject to attract the interest of the student community who wish to master cheminformatics as a career. The topics chosen cover the entire spectrum of cheminformatics activities (methods, data and tools). The algorithms, open source databases, tutorials supporting theory using standard datasets, guidelines, questions and do it yourself exercises will make it valuable to the academic research community. At the same time every section of the training devotes a section on development of new software tools relevant for the growing pharmaceutical, fine chemicals and life sciences industry. (Reference: Cheminformatics <http://www.springer.com/in/book/9788132217794>)

Title	:	Cheminformatics
Duration	:	3 Weeks (15 training days)
No. of Seats	:	20
Educational Qualification	:	M. Sc. Chemistry, Biology, Biotechnology
Medium of instruction	:	English
Venue of the course	:	CSIR-National Chemical Laboratory, Pune
Course Fee	:	For Indian Nationals: Rs. 10,000/- (Student), Rs. 20,000/- (Faculty), Rs. 30,000/- (Industry Sponsored Candidate) For Foreign Nationals: US \$3000

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Course Coordinator : Dr. M. Karthikeyan ([M.Karthikeyan@ncl.res.in](mailto:M.Karthikeyan@ncl.res.in))

5. **Embedded Systems** (27<sup>th</sup> June to 17<sup>th</sup> July 2018)

course code: SDP\_NCL05

Embedded Systems are inevitable part of today's digital world and in the area of Automobiles, Computers, Electronics, Mechanical engineering. There is a paucity of embedded engineers to work in automation, automobile and other industries due to inadequate knowledge and hands on experience on microcontroller based development during diploma / degree courses. This course gives the opportunity for engineers who are afraid but would like to work in embedded field with full dedication to make their career are welcome for this course. Course gives emphasis right from assembly programming for 8 bit 8051 microcontroller, and embedded C programming for 32 bit RISC ARM microcontrollers along with hands on work on hardware and peripherals.

Title	:	Skill development course in Embedded Systems
Duration	:	3 Weeks (15 trainings Days)
No. of Seats	:	20
Educational Qualification	:	Diploma, B.E., B.Sc., M.Sc. (Electrical, E&TC. Instrumentation, Electrical, Computer, Information Technology, etc.)
Medium of instruction	:	English
Venue of the course	:	CSIR-National Chemical Laboratory, Pune
Course Fee	:	For Indian Nationals: Rs. 10,000/- (Student), Rs. 20,000/- (Faculty) Rs. 25,000/- (Industry Sponsored Candidate) For Foreign Nationals: US \$4000

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Course Coordinator : Dr. Mrs. N. S. Iyer ([ns.iyer@ncl.res.in](mailto:ns.iyer@ncl.res.in))

6. **Drug Polymorphism and Pharmaceutical Cocrystals** (24<sup>th</sup> September to 12<sup>th</sup> October 2018)

course code: SDP\_NCL06

Polymorphs, salts, hydrates and cocrystals are gaining tremendous importance in pharmaceutical industries because of their ability to modify physicochemical and pharmacological properties of API (active pharmaceutical ingredients) without affecting their therapeutic efficacy. Therefore, pharmaceutical companies are focusing on screening for APIs for polymorphism and the development aspects of novel salts/cocrystals that include physicochemical characterization, scale up, processing and formulations of these materials. This necessitates the requirement of proper training course to the employees involved in the characterization, and formulation of pharmaceutical solids as well as to the fresh M. Sc. students who can explore job opportunities after attending the proposed course. This course was envisaged and planned keeping in view the need of the pharmaceutical industry for the trained and skilled manpower for polymorph and cocrystal screening of APIs and the development aspects of these novel solid forms.

Title	Polymorphism in Pharmaceutical Solids and Pharmaceutical Cocrystals
Duration	: 3 Weeks (15 training Days)
No. of Seats	: 10-30
Educational Qualification	: B. E., B. Tech., M. Sc., M. Pharm.
Medium of instruction	: English, local Indian language
Venue of the course	: CSIR-NCL, Pune
Course Fee	: For Indian Nationals: Rs. 10,000/- (Student), Rs. 20,000/- (Faculty) Rs. 25,000/- (Industry Sponsored Candidate) For Foreign Nationals: US \$3000

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Course Coordinator : Dr. R. G. Gonnade ([rg.gonnade@ncl.res.in](mailto:rg.gonnade@ncl.res.in))

## 7. **Effective Science Communication** (4<sup>th</sup> December to 20<sup>th</sup> December 2018)

course code: SDP\_NCL07

*This is an opportunity to graduates and post graduates with an interest to communicate science and technology.*

Any information on science is effective when it creates interest, attracts involvement, generates curiosity and opens opportunities to explore in the direction of enhancement by progressing knowledge and implementing it for creating solutions to existing problems of connecting ourselves and others.

In the two week program, the course will cover important aspects on the theory, evolution and history of science communication, creating and drafting science news, science fiction and stories, short films, and enhance writing and presenting skills, risks handling, ethics, evidence based science management and patent drafting (for interested participants). The course will end in a project submission from the students with a certificate of participation.

Title	:	Effective Science Communication
Duration	:	3 weeks (15 training days)
No. of Seats	:	30-35
Educational Qualification	:	Minimum Graduate or Postgraduate with fluency / knowledge in English speaking and writing / having science background will be preferred
Medium of instruction	:	English, local Indian language
Venue of the course	:	CSIR-National Chemical Laboratory, Pune
Course Fee	:	For Indian Nationals: Rs. 10,000/- (Student), Rs. 20,000/- (Faculty) Rs. 25,000/- (Industry Sponsored Candidate)

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Course Coordinator                      Dr.(Mrs) Masih Wafia ([ws.masih@ncl.res.in](mailto:ws.masih@ncl.res.in))

8. **Biocompatible and Biodegradable Polymers** (19<sup>th</sup> February to 9<sup>th</sup> March 2018)

course code: SDP\_NCL08

Currently nanotechnology has wide applications in fiber and textiles, agriculture, electronics, forensic science, space and medical therapeutics. Biodegradable nanoparticles are usually improved for therapeutic value of various water soluble/insoluble active ingredients and bioactive molecules by modifying bioavailability, solubility and retention time. These nanoparticles–drug formulation reduces the patient expenses, and risks of toxicity. Nanoencapsulation of nanomedicines increases drug efficacy, specificity, tolerability and therapeutic index of corresponding drugs which have many advantages in the protection of premature degradation, interaction with the biological environment, enhancement of absorption into a selected tissue, bioavailability, retention time and improvement of intracellular penetration.

Title	:	Application of Biocompatible and Biodegradable Polymers as Delivery Vehicles for active Ingredient
Duration	:	3 weeks (15 training days)
No. of Seats	:	30
Educational Qualification	:	M. Sc., Ph. D. in Chemistry
Medium of instruction	:	English
Venue of the course	:	CSIR-National Chemical Laboratory, Pune
Course Fee	:	For Indian Nationals: Rs. 10,000/- (Student), Rs. 20,000/- (Faculty) Rs. 25,000/- (Industry Sponsored Candidate) For Foreign Nationals: US\$ 3000

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Course Coordinator : Dr. Mrs. B. Garnaik ([b.garnaik@ncl.res.in](mailto:b.garnaik@ncl.res.in))

## 9. X-ray Crystallography (11<sup>th</sup> June to 29<sup>th</sup> June 2018)

course code: SDP\_NCL09

X-ray crystallography is the most powerful method for determining accurate and precise crystal structures of small as well as macromolecules (protein, peptide, nucleic acids, polymer, etc.). Crystallographers discovered that crystals, because of their regular arrangement of atoms, scattered the rays in just a few specific directions. By measuring these directions and the intensity of the scattered beams, scientists were able to determine a three-dimensional structure of the crystal. Single-crystal X-ray crystallography is widely considered to be the standard for establishing the structures of crystalline solids. This method is used to establish patent claims, establish structure-property relationships for new compounds, and many other applications. However, powder crystallography instrumentation and data analysis software have emerged over the past 30 years as powerful methods for investigating the structures of materials that cannot be studied with single-crystal methods. Powder methods are used in a wide variety of investigations, including forensic analyses, identifying components of mixtures, and identifying properties of polymers and other poorly crystallized materials. X-ray crystallography has become the leading technique for studying the atomic structure and related properties of materials. It is now at the centre of advances in many fields of science. In the last century, crystallography has been a primary force in driving major advances in the detailed understanding of materials, synthetic chemistry, the understanding of basic principles of biological processes, genetics, and has contributed to major advances in the development of drugs for numerous diseases. As a science, crystallography has produced 28 Nobel Prizes, more than any other scientific field.

Title	X-ray Crystallography and Structure of Solids
Duration	: 3 Weeks (15 training days)
No. of Seats	: 20-30
Educational Qualification	: B. E., B. Tech., M. Sc., M. Pharm. M. Tech.
Medium of instruction	: English
Venue of the course	: CSIR-National Chemical Laboratory, Pune.
Course Fee	: For Indian Nationals: Rs. 10,000/- (Student), Rs. 20,000/- (Faculty) Rs. 25,000/- (Industry Sponsored Candidate) For Foreign Nationals: US \$3000

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Course Coordinator Dr. Rajesh G. Gonnade ([rg.gonnade@ncl.res.in](mailto:rg.gonnade@ncl.res.in))

## 10. Training Programme on preparation of natively unfolded proteins/ molecular chaperones in human disease biology

(4<sup>th</sup> November to 21<sup>st</sup> November 2018)

course code: SDP\_NCL10

This course includes theory, demonstration and practical classes on preparation of natively unfolded Tau, preparation of molecular chaperones followed by checking of the prepared Tau in Mammalian Cells (Neuron/Astrocytes)

Title	:	Preparation of natively unfolded proteins/molecular chaperones in human disease biology
Duration	:	3 Weeks (15 training days)
No. of Seats	:	20
Educational Qualification	:	Prior exposure or basic knowledge about the proposed activity
Medium of instruction	:	English
Venue of the course	:	CSIR-National Chemical Laboratory, Pune
Course Fee	:	Rs. 10,000/- (Student), Rs. 20,000/- (Faculty) Rs. 25,000/- (Industry Sponsored Candidate) For Foreign Nationals: US \$2500

For foreign national course fee include training fees, expenses towards boarding & lodging of the participants, local transportation costs, other associated expenses and institute overheads whereas for the Indian national the course fee include training fees, lunch and breakfast and institute overheads. Accommodation to the Indian national will be provided in NCL at nominal charges.

Course Coordinator : Dr. Subashchandraboze Chinnathambi  
([s.chinnathambi@ncl.res.in](mailto:s.chinnathambi@ncl.res.in))

## 11. Basic to advanced training in infrared (IR) spectroscopy

(12<sup>th</sup> March to 30<sup>th</sup> March 2018)

course code: SDP\_NCL11

Infrared (IR) spectroscopy is an extremely powerful tool to determine the functional groups in molecules. IR spectroscopy is widely used in industry as well as in research. It is a simple and reliable technique for measurement, quality control and dynamic measurement. It is also employed in forensic analysis - in civil and criminal analysis. In this workshop/course, we will discuss the basics of IR spectroscopy and the operating principles of the IR spectrometer. Hands on training of recording IR spectra using a spectrometer in the solid as well as liquid samples will be provided. Furthermore, methods of analysis (baseline subtraction, curve-fitting, multi-peak fitting, deconvolution, etc.) of the IR spectra will be discussed. Hands on training on the same will be provided on training data-sets.

Title	: Training workshop in infrared (IR) spectroscopy
Duration	: 3 weeks (15 training days)
No. of Seats	: 10
Educational Qualification	: Basic knowledge in spectroscopy and functional groups in chemistry
Medium of instruction	: English
Venue of the course	: CSIR-National Chemical Laboratory, Pune.
Course Fee	: For Indian Nationals Rs. 10,000/- (Students), Rs. 20,000/- (Faculty) Rs. 25,000/- (Industry Sponsored Candidate) For Foreign Nationals: US \$5000

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Course Coordinator : Dr. Sayan Bagchi ([s.bagchi@ncl.res.in](mailto:s.bagchi@ncl.res.in))

12. **Spectroscopic Measurement Techniques – Raman, IR, UV-Vis and Fluorescence (SPECTEC)** (24<sup>th</sup> September to 12<sup>th</sup> October 2018)

course code: SDP\_NCL12

Under the SDP on Spectroscopic Measurement Techniques, the participants will be trained on Raman spectrometer, FTIR Spectrometer, Fluorescence Spectrometer and UV-Vis Spectrophotometer for the characterization of a variety of materials including carbon nanotubes, graphene, metal and metal oxide nanomaterials, polymeric materials and their composites. These techniques are extensively used to know the nature of bonding, crystallinity, structural disorder, and study the effects of different physical and chemical stresses on their properties. After the successful training, the participants will be able to serve as technical personnel in the companies dealing with these instruments and research laboratories using these techniques for materials' characterization.

Title	:	Spectroscopic Measurement Techniques (SPECTEC)
Duration	:	3 weeks (15 training days)
No. of Seats	:	40
Educational Qualification	:	M.Sc. / M.Tech. (Physical Chemistry/ Analytical Chemistry/ Materials Science/ Nanotechnology)
Medium of instruction	:	English
Venue of the course	:	CSIR-National Chemical Laboratory, Pune
Course Fee	:	For Indian Nationals Rs. 10,000/- (Students), Rs. 25,000/- (Faculty) Rs. 30,000/- (Industry Sponsored Candidate) For Foreign Nationals: US \$3000

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Course Coordinators	:	Dr. Suresh P. Gokhale ( <a href="mailto:sp.gokhale@ncl.res.in">sp.gokhale@ncl.res.in</a> ) Dr. BLV Prasad ( <a href="mailto:pl.bhagavatula@ncl.res.in">pl.bhagavatula@ncl.res.in</a> ) Mrs. Rupali P. Waichal ( <a href="mailto:rp.waichal@ncl.res.in">rp.waichal@ncl.res.in</a> )
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**13. Basic training in Electron Microscopy and Techniques (Electron Microscopic Analyst) (13<sup>th</sup> August to 31<sup>st</sup> August 2018)**

course code: SDP\_NCL13

Electron Microscopy is a fast evolving technique in several advancing fields of science including, materials science, solid state physics, metallurgy including coating, corrosion, biology, pharmaceutical and formulation industries, dye and paint industry, polymer industries etc., specifically in the domain of nano science and nanotechnology. Particularly recent developments in the highly resolvable electron microscopy such as STEM, cryo-TEM, Environmental SEM enables a researcher to get the best for instance, details about lattice fringes, atomic positions at sub nanometer scales or analysing bio samples at near life conditions. Extended analyses such as EDS gives chances for elemental mapping and even phase mapping possibilities at sub-micron to few nanometer scales. This course would cover basics of electron-matter interactions, introduction to SEM, TEM and HRTEM, various special modes of electron microscopies, possible scientific data from electron microscopy, data acquisition and analysis. The participants would be able to know various electron microscopic techniques, data collection and data analysis to interpret into scientific information needed for research and industry. Practical experience with our electron microscopes will ensure a complete learning experience.

Title	:	Basic training in Electron Microscopy and Techniques
Duration	:	3 weeks (15 training days)
No. of Seats	:	15
Educational Qualification	:	M.Sc. / M.Tech. (Physical Chemistry/ Analytical Chemistry/ Materials Science/ Nanotechnology)
Medium of instruction	:	English
Venue of the course	:	CSIR-National Chemical Laboratory, Pune
Course Fee	:	For Indian Nationals Rs. 10,000/- (Students), Rs. 30,000/- (Faculty) Rs. 40,000/- (Industry Sponsored Candidate) For Foreign Nationals: US \$5000

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Course Coordinators : Dr.KaliaperumalSelvaraj [k.selvaraj@ncl.res.in](mailto:k.selvaraj@ncl.res.in)  
Dr. BLV Prasad ([pl.bhagavatula@ncl.res.in](mailto:pl.bhagavatula@ncl.res.in))

**14. Basic training on spectroscopic ellipsometer, atomic force microscope, TGA/DTA, DSC, Physical property measurement system (PPMS) and impedance spectroscopy (2<sup>nd</sup> April to 27<sup>th</sup> April 2018)**

**course code: SDP\_NCL14**

This extensive course will provide a basic training (including hands-on) on some of the advanced tools used for the material characterization including thermal, optical, ac/dc electrical, ac/dc magnetic, Hall measurements etc. This programme includes the following modules (1) Spectroscopic ellipsometry which is a very important surface science technique for optical properties, very useful metrology tool in electronic industry, silicon fabrication labs, optical devices etc.. It is also immensely popular in the photonic, polymer, and ophthalmic industries as well. This technique can give the individual film thickness, bandgap, refractive index, surface roughness, and porosity for the thin films coated on a substrate. (2) Physical property measurement system: This tool is equipped with a 9 T superconducting magnet and has a temperature range of 2-400K and can measure dc/ac magnetization, hysteresis, thermoelectric figure of merit, thermal conductivity, Seebeck coefficient, Hall effect etc. (3) Differential thermogravimetric analysis. Thermogravimetric analysis and Differential scanning calorimetry techniques for a complete thermal analysis (4) Atomic force microscopy: This surface science tool can measure the surface roughness, particle size, elasticity, plasticity, adhesiveness etc. (5) Impedance spectroscopy: This tool can give capacitance, real and imaginary permittivity, loss tangent etc. for thin films and pellets in the range from micro Hz to 20 MHz. Student will learn how to make sample cell on their own for customized experiments.

Title	:	A training programme on advanced material characterization techniques
Duration	:	4 weeks (20 training days)
No. of Seats	:	20
Educational Qualification	:	10+2 level knowledge in physics
Medium of instruction	:	English
Venue of the course	:	CSIR-National Chemical Laboratory, Pune
Course Fee	:	For Indian Nationals: Rs. 15,000/- (Student), Rs. 35,000/- (Faculty) Rs. 45,000/- (Industry Sponsored Candidate) For Foreign Nationals: US \$7000

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Course Coordinator : Dr. Pankaj Poddar ([p.poddar@ncl.res.in](mailto:p.poddar@ncl.res.in))

## 15. Lab VIEW basics and applications (3<sup>rd</sup> September to 21<sup>st</sup> September 2018)

course code: SDP\_NCL15

LabVIEW- Laboratory Virtual Instrument Engineering Workbench, by National Instruments is a system-design platform and development environment for a graphical language – visual programming language, originally released for the Apple Macintosh in 1986. LabVIEW is commonly used for data acquisition, instrument control, and industrial automation on a variety of platforms including Microsoft Windows, various versions of UNIX, Linux, and Mac OS X. LabVIEW is a powerful tool to surpass Windows OS limitations and effectively used for real time developments. Smart developments in instrumentation, Test & Measurement instruments are developed using LabVIEW intelligence and interfaces. Globally LabVIEW is given high importance in engineering syllabus. Experience in LabVIEW based developments and in testing & maintenance is highly acknowledged. To be at par with global trends and technology, proficiency in LabVIEW is necessary for engineers in both academic and industrial careers.

Course includes – WHY LabVIEW, basic logic development using “C” programming, concept of parallel programming using LabVIEW instead of using multi core CPUs, LabVIEW graphical development system, virtual instrumentation approach, hands on - LabVIEW Environment - Front Panel / Block Diagram, Toolbar /Tools Palette, wires, data types, variables, connector panel, math in LabVIEW, data flow programming, Components of a LabVIEW Application - Creating a VI, Data Flow Execution, Additional Help - Finding Functions, debugging techniques, context help window, elements of typical program, clusters, loop, how to make decisions, Getting Data into your Computer- Data Acquisition Devices - NI-DAQ, Simulated Data Acquisition, PC motherboard design, concept of PC add on cards and addressing, ADDA card, image acquisition card, Communication protocols – RS232, USB, GPIB/IEE488, introduction to cDAQ and C modules.

Title	: Skill Development course in LabVIEW basics and applications
Duration	: 3 weeks (15 training days)
No. of Seats	: 14
Educational Qualification	: BE/M.Sc./M.Tech. (E&TC, Instrumentation, Electrical, Mechanical, Automobile, Mechatronics.)
Medium of instruction	: English
Venue of the course	: CSIR-National Chemical Laboratory, Pune
Course Fee	: For Indian Nationals: Rs. 10,000/- (Student), Rs. 25,000/- (Faculty) Rs. 30,000/- (Industry Sponsored Candidate) For Foreign Nationals: US \$4000

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Course Coordinator : Dr. Neelima Iyer ([ns.iyer@ncl.res.in](mailto:ns.iyer@ncl.res.in))

16. **Controlled release of active molecules: hands on preparation, characterization and release studies of active molecules**

(8<sup>th</sup> October to 26<sup>th</sup> October 2018)

course code: SDP\_NCL16

Active molecules (pesticides, drugs, nutrients, perfumes, detergents, proteins, peptides, etc.) when exposed to unfavourable conditions the molecules may become unstable, inactive and vary the physical or chemical properties. To avoid the above effects and to maintain the shelf life of the active molecules an inert supporting material is essential. The supporting material could be based on polymer or inorganic materials or combination of both. Depending on the suitability of the active molecules, the matrices and encapsulation in macro, micro and nano forms can be designed. In this workshop we describe the methods involved in preparation, characterization and analysis of the matrices and encapsulates. And also demonstrate methods to estimate the qualitative analysis of active molecules.

**Instruments involved in these studies:** HPLC, LC-MS, UV-visible spectrophotometer, FTIR spectroscopy, electrospinning unit, tablet dissolution test and optical microscope (instruments as mentioned will be used for characterization of active molecules).

Title	:	Immobilization of active molecules: hands on preparation, characterization and analysis of supporting material with active molecules
Duration		3 weeks (15 training days)
No. of Seats		10
Educational Qualification		Bachelor degree in sciences
Medium of instruction		English
Venue of the course	:	CSIR-National Chemical Laboratory, Pune
Course Fee	:	For Indian Nationals: Rs. 10,000/- (Student), Rs. 20,000/- (Faculty) Rs. 30,000/- (Industry Sponsored Candidate) For Foreign Nationals: US \$3000

For foreign national course fee include training fees, expenses towards boarding & lodging of the participants, local transportation costs, other associated expenses and institute overheads whereas for the Indian national the course fee include training fees, lunch and breakfast and institute overheads. Accommodation to the Indian national will be provided in NCL at nominal charges.

Course coordinators	Dr. GVN Rathna ( <a href="mailto:rv.gundloori@ncl.res.in">rv.gundloori@ncl.res.in</a> ) Dr. B. Santhakumari ( <a href="mailto:b.santhakumari@ncl.res.in">b.santhakumari@ncl.res.in</a> ) Mr. P.R. Suresha ( <a href="mailto:pr.suresha@ncl.res.in">pr.suresha@ncl.res.in</a> ) Mr. Arun Torris ( <a href="mailto:t.arun@ncl.res.in">t.arun@ncl.res.in</a> ) Ms. Poorvi Purohit ( <a href="mailto:pm.purohit@ncl.res.in">pm.purohit@ncl.res.in</a> )
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17. **Beyond Genomes: Functional genomics and genome editing technologies, and their applications** (17<sup>th</sup> September to 5<sup>th</sup> October 2018 )

course code: SDP\_NCL17

With the advent of next generation sequencing (NGS) technologies, it has become extremely easy and economical to generate genomic DNA sequence data. This is also being complemented by RNA sequencing, which provides unprecedented resolution in the analysis of gene expression and its regulation. However, it has become a challenge to analyze and mine the wealth of sequence data that is being generated in today's laboratories, in addition to the open access data that is available in the public domain. Looking into the future, it is obvious that genomics based biotechnology applications will play a huge role in human health / disease diagnostics, agriculture and animal husbandry. Moreover, the recent advancements in genome editing technologies has the potential to revolutionize these areas by enhancing and simplifying our ability to engineer and deploy genetically modified organisms (transgenic species) for R & D purpose as well as for several biotechnology applications.

The aim of this workshop/course is to familiarize the participants with the various NGS technologies and help them learn to mine the genomic and transcriptomics data for comparative and functional genomics studies. The topics covered will include mining genome sequence data for disease diagnostics, comparative genomics for phenotype to genotype correlations, transcriptomics data analysis for gene expression studies, genome editing technologies (including CRISPR/Cas9 and its variations), and applications of genomics in industry.

Title	:	Beyond Genomes: Functional genomics and genome editing technologies, and their applications
Duration	:	3 weeks (15 training days)
No. of Seats	:	10
Educational Qualification	:	Basic knowledge in molecular biology
Medium of instruction	:	English
Venue of the course	:	CSIR-National Chemical Laboratory, Pune
Course Fee	:	For Indian Nationals: Rs. 10,000/- (Student), Rs. 20,000/- (Faculty) Rs. 25,000/- (Industry Sponsored Candidate) For Foreign Nationals: US \$5000

For foreign national course fee include training fees, expenses towards boarding & lodging of the participants, local transportation costs, other associated expenses and institute overheads whereas for the Indian national the course fee include training fees, lunch and breakfast and institute overheads. Accommodation to the Indian national will be provided in NCL at nominal charges.

Course coordinators	Dr. Dhanasekaran Shanmugam( <a href="mailto:d.shanmugam@ncl.res.in">d.shanmugam@ncl.res.in</a> ) Dr. Narendra Kadoo ( <a href="mailto:ny.kadoo@ncl.res.in">ny.kadoo@ncl.res.in</a> )
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## 18. Density Function Theory (DFT) for chemists and physicists

(2<sup>nd</sup> July to 20<sup>th</sup> July 2018)

**course code: SDP\_NCL18**

Density functional theory (DFT) is a state-of-the-art computational method for bringing out correlation between the structure and properties within the systems ranging from molecules to surfaces to bulk. It is the most widely used methodology in chemistry and materials science for understanding processes, mechanisms and response properties. Employing DFT, one can understand why one chemical reaction happens and another does not, and thus is extremely useful in predicting the properties of newly developed molecules and materials. This course will provide all the necessary know-how, starting from an elementary level, of the fundamental concepts of DFT, as well as how one can apply it for solving problems in physics and chemistry. In the course, both atom centered and plane wave based methods will be covered.

Title	:	Density Function Theory (DFT) for chemists and physicists
Duration	:	3 weeks (15 training days)
No. of Seats	:	10-20
Educational Qualification	:	M. Sc., M. Pharm., B. E., B. Tech., M. E., M. Tech.
<b>Medium of instruction</b>	:	English
<b>Venue of the course</b>	:	CSIR-National Chemical Laboratory, Pune
Course Fee	:	For Indian Nationals: Rs. 10,000/- (Student), Rs. 25,000/- (Faculty) Rs. 50,000/- (Industry Sponsored Candidate) For Foreign Nationals: US \$5000

For foreign national course fee include training fees, expenses towards boarding & lodging of the participants, local transportation costs, other associated expenses and institute overheads whereas for the Indian national the course fee include training fees, lunch and breakfast and institute overheads. Accommodation to the Indian national will be provided in NCL at nominal charges.

Course coordinator      Dr. Kumar Vanka ([k.vanka@ncl.res.in](mailto:k.vanka@ncl.res.in))

### Detailed Information and Instructions

The above mentioned courses will be conducted at CSIR-National Chemical Laboratory, Dr. Homibhabha Road/ Pashan Road, Pune-411008.

[We have successfully completed 5 courses in the second half of 2017](#)

#### **SALIENT FEATURES OF THE TRAINING COURSES:**

- ▶ Theory and higher importance for Practicals
- ▶ Lectures, assisted with multimedia aids
- ▶ Case studies
- ▶ Group discussions
- ▶ Hands - on - practical experience
- ▶ Assignments / Online Material
- ▶ Brief on alternate career options

#### **EVALUATION OF TRAINEES:**

Evaluation will consist of the following components

- Theory Courses
- Written question paper
- Student Participation to all sessions
- Practical Courses
- Video / Audio

#### **CERTIFICATION:**

A suitable course completion certificate will be issued to the successful candidates.

#### **APPLICATION PROCEDURE:**

Please read the instructions carefully before applying to ensure selection.

Candidates interested in the above course(s) need to apply through their Principal/ Employer/Director/HOD in the [prescribed format/appl. link](#). Filled application must be sent to [ncl.sdtc@ncl.res.in](mailto:ncl.sdtc@ncl.res.in)

**Age:** No age limit

**Last date or Due date for applying:** Last date for applying to any course is 10 days (working days) before the beginning date of the given course. The selected candidates will be informed via e-mail.

**Selection Procedure:** First come first served basis.

All correspondence related to this programme will be done by e-mail.

Only short-listed candidates will be informed via email; who would further need to send in their acceptance along with course fee (as Demand Draft in favor of Director, NCL; payable at Pune).

**Mailing address for sending acceptance letter and Demand Draft:**

Coordinator, CSIR-NCL Skill Development Program

CMC Division, CSIR- National Chemical Laboratory

Dr. Homi Bhabha Road, PUNE-411008, India.

**Accommodation Facility:** Accommodation will be provided on payment basis depending on the availability. Charges - Industry/ Faculty applicant Rs. 1000/-, Student Rs. 500/- (for the duration of course+2days)

Note: Fee will not be refunded under any circumstances once paid

**For Further Information or any clarifications Please Contact:**

**Co-ordinator**

CSIR-NCL Skill development program

[ncl.sdte@ncl.res.in](mailto:ncl.sdte@ncl.res.in)

New courses will be introduced in due course of time; please keep visiting this website for new announcements.