

**Title**

Extraction of Non-Ferrous Metals and their recycling

**About the Programme**

A short term course will be organized to meet the requirement of non-ferrous industries producing copper, nickel, cobalt, zinc, lead etc from primary and secondaries resources. The course will highlight the hydrometallurgical as well as pyrometallurgical processing to recover the metallic values from lean, complex ores and secondaries using roasting, smelting, leaching, bio-leaching, pressure leaching, solvent extraction, ion exchange, electrolysis etc. The course lecture will be followed by the demonstration of few unit operations on laboratory scale. The tentative titles of the lectures are given below.

- Fundamentals in metal extraction
- Role of mechanical activation for metal extraction
- Aluminium extraction : Technological innovations
- Development of lead-zinc extraction processes from secondaries
- Bio-hydrometallurgy and metal extraction
- Solvent extraction/ ion exchange for metal separation and recovery
- Precious metal recovery from electronic waste
- Environmental aspects during processing of non-ferrous metals etc

Suppliers/ vendors for display of their instruments/ products on charge/ payment basis:  
Non-ferrous metals/ powder producing industries, Instruments producing/ supplier companies.

**Level**

Graduate/Post Graduate in Chemistry/Metallurgy/ Chemical Engg.

**No. of Participants**

20

**Duration**

January 21-23, 2008

**Training Fees**

Rs. 7,000/- (non-residential), Rs. 10,000/- (residential)

**Coordinator(s) :**

Dr V. Kumar/ Dr K.K. Sahu

**Title**

Agglomeration and characterization of iron bearing raw materials for blast furnace iron making

**About the Programme**

The training program aims at focusing on various aspects of sintering process and the testing techniques for physical and chemical characteristics of the iron bearing raw materials. The program includes a lecture series on the relevant topics, followed by hands on demonstration of sintering process in laboratory scale and various testing techniques with an emphasis on the implication of the test results on the operation and performance of the blast furnace.

The program has been designed for the engineers and operators of the blast furnace and the personnel involved in raw material preparation & characterization.

**Level**

Graduate/Post Graduate in Chemistry/Metallurgy/ Chemical Engg.

**No. of Participants**

20

**Duration**

October 3-5/ 10-12, 2007

**Training Fees**

**Coordinator(s) :**

Dr. D. Bandyopadhyay/ Sri M. C. Goswami

**Title**

Special metal castings and forming processes

**About the Programme**

The advances in metal casting and forming technology have led to the resurgence of manufacturing sectors. Metal casting industries including the automobile sector are facing a high level of competition from newer methods and materials. It needs to accept the dynamic environments and update its technology for manufacturing products with consistent quality. The basic objective of the workshop is to bring together participants from industries, R & D organization and academic institutions to focus on the special metal casting and forming processes. The course shall be designed to impart required knowledge base on the subject.

The brief content of the course are

- Special casting technology:
- Die casting, Investment casting, Centrifugal casting, Squeeze castings,
- Rheocasting, Thixocasting and Thixoforming.
- Few special alloys for automobile sectors – SGI, ADI, Al-foam, special Al & Mg alloys.
- Forming technology
- Rolling, Forging, Extrusion
- Severe plastic deformation – accumulated roll bonding (ARB), equi channel angular processing (EACP), metal cladding, Demonstration of forming technology,
- Futuristic materials for automobile & aerospace sectors .

**Level**

Graduate/Post Graduate in Chemistry/Metallurgy/ Chemical Engg.

**No. of Participants**

20

**Duration**

25–26<sup>th</sup> February, 2008

**Training Fees**

Rs. 7000/- (Residential), Rs. 5000/- (Non-residential)

**Coordinator(s) :**

Dr. K. L. Sahoo/Mr. Gopi Kishor Mandal

**Title**

Heat Treatment and Surface hardening of Iron and Steels

**About the Programme**

Steel being used in every field of engineering has a unique role, both in sophisticated and in simple component. Presently an extensive research and development work is going on to improve the product quality, optimisation and cost effectiveness. Latest computerised techniques have taken an important role to change the scenario of manufacturing systems. The persons engaged in the process control thus need to be conversant with the latest developments for specific use of the engineering goods with specific physical and mechanical properties. Various heat treatment processes have major role in these studies. Heat treatment has been under going rapid changes in recent era. These changes are brought about due to the stringent restriction of environmental considerations and increasing cost of power. Surface engineering on the other hand has been gaining importance by virtue of developments among other technologies such as improvement of furnace technology, generation of laser beams, gas quenching, plasma processing etc. The objective of this workshop is to introduce the subject in the background of Physical metallurgy and up gradation of other specialised area in the field of heat treatment to the participants from industries and other Govt. R & D organisation.

The brief content of the course are

- Introduction of physical metallurgy
- Heat treatment of metal and its alloys.
- Surface treatment.
- Evaluation of mechanical properties.

**Level**

Graduate/Post Graduate in Chemistry/Metallurgy/ Chemical Engg.

**No. of Participants**

20

**Duration**

September 5-7, 2007

**Training Fees**

Rs. 10,000/- (Residential), Rs. 7000/- (Non-residential)

**Coordinator(s) :**

P. K. De, Scientist/Dr. S. Ghosh Choudhury, Scientist/Dr. K. L. Sahoo, Scientist, MEF Division.

**Title**

Solid Waste Management in Iron & Steel Sector

**About the Programme**

In view of the enormous importance of the subject especially in relation to the iron & steel sector, the National Metallurgical Laboratory (CSIR), Jamshedpur is planning to organise a National Workshop on “*Solid Waste Management in Iron & Steel Sector*” (EWM-2008) during January 30-31, 2008 at Jamshedpur. The event will provide a forum for in-depth discussion and analyses of important issues relating to the above topic and recommend suitable remedies for the present and future. This event will be a continuation of Environmental & Waste Management (EWM) series of seminars/workshops organised by NML earlier.

The brief content of the course are

- Solid waste utilisation and management in iron & steel sector
- Characterisation and classification of solid wastes from steel and allied sector
- Emerging R&D areas for solid waste utilisation
- Current state of technology in the utilisation of solid wastes
- Emerging technological issues and cleaner technology development
- Life cycle assessment (LCA) in steel sector
- Production of value added materials from solid wastes
- Toxicological issues in solid waste utilisation
- Immobilisation of toxicity through geopolymerisation

**Level**

Graduate/Post Graduate in Chemistry/Metallurgy/ Chemical Engg.

**No. of Participants**

20

**Duration**

January 31 - February 1, 2008

**Training Fees**

Rs. 4000/- (Residential), Rs. 6000/- (Non-residential)

**Coordinator(s) :**

Dr. Amitava Bandopadhyay.

**Title**

Advanced gravity concentration

**About the Programme**

Gravity concentration is undoubtedly the most used concentration technique in Mineral Processing. However, it has certain inherent inefficiencies. The most notable being its inability to deal with fines. The settling characteristics of the fines are indeed very poor. This renders many of the conventional units inadequate to treat fines. The concept of enhanced gravity separation (EGS) making use of a centrifugal field to improve the settling characteristics has caught the imagination of scientists and researchers for quite some time. EGS has developed into a significant field of research and the efforts led to the invention of various processing units, some of which are in industrial operation today. Conventional concentration has also experienced a sea change in its approach. A number of notable developments have taken place to overcome some of the shortcomings. Keeping such needs in mind NML is proposing to hold a three-day seminar on Advanced Gravity Separation in September 2008 at NML Jamshedpur premises. The seminar would also include a half-day visit to NML pilot plant and live demonstration of advanced gravity separation units at NML.

The brief content of the course are

- Gravity concentration practice
- Bottlenecks in conventional gravity concentration
- Advancement in conventional units to overcome the shortcomings
- Recent developments in Heavy Medium Separation
- Developments in dry gravity separation and its application
- Emergence of Enhanced Gravity Concentration (EGS)
- Developments in various EGS units e.g. MGS, Falcon, Knelson, Kelsey Jig, etc.
- Importance of EGS in Fine Particle Processing
- Emergence of EGS as a competitor of flotation
- Process Modeling, Simulation and Control

**Level**

Graduate/Post Graduate in Chemistry/Metallurgy/ Chemical Engg.

**No. of Participants**

20

**Duration**

August 30-September 01, 2007

**Training Fees**

Rs. 2500/- for IIME members Rs. 1000/- for others

**Coordinator(s) :**

Dr. Avimanyu Das and Dr. K. V. Rao

**Title**

Beneficiation of Iron Ores

**About the Programme**

Considering the phenomenal growth in iron and steel industry, increasing demand for quality iron ores, need for rational utilisation of iron ore resources and meeting environment regulations call for a re-look at the present beneficiation technology. Huge opportunities have also emerged in the wake of economic reforms and globalisation leading to massive investment in mineral sector in general and iron ores in particular. Since early 50's National Metallurgical Laboratory (NML) has been involved in characterisation and beneficiation of iron ores from entire geographical region of the country and provided know-how for setting up iron ore beneficiation and agglomeration plants. NML has also carried out detailed studies on iron ore samples from countries like Egypt, Syria, Ukraine, Nepal etc. and developed processes for beneficiation and agglomeration of iron ores. With the expertise developed at NML, it is proposed to hold a three days short term course on "Beneficiation of Iron Ores" to share some of the experience with the colleagues from industries and other R&D institutes.

The brief content of the course are

- Iron ore Resources and Requirements for Iron making
- Characteristics of Indian Ores
- Present Industrial Beneficiation Practice and their Limitations
- Advances in Beneficiation Techniques & Recent Trends
- Selected Case Studies
- Processing of Fines and Slimes and their Utilisation

**Level**

Plant Managers, Engineers, Supervisors and plant practitioner, Personnel involved with iron ore processing.

**No. of Participants**

20

**Duration**

Nov. 28-30, 2007

**Training Fees**

Rs. 6000/- (non-residential); Rs. 9000/- (residential)

**Coordinator(s) :**

Dr, Ratnakar Singh / Dr. R.P.Bhagat

**Title**

Failure Analysis

**About the Programme**

Failure of a component indicates it has become completely or partially unusable or has deteriorated to the point that it is undependable or unsafe for normal sustained service. Failure analysis and prevention are important functions to all of the engineering disciplines. The materials engineer often plays a lead role in the analysis of failures, whether a component or product fails in service or if failure occurs in manufacturing or during production processing. In any case, one must determine the cause of failure to prevent future occurrence, and/or to improve the performance of the component or structure. The training covers the following the topics consisting tutorials and hands-on experiments.

- Procedure of Failure Analysis
- Identification of Failure mode/mechanism
- Causes of Failure
- Metallurgy, Testing Procedures & Standards
- Case Studies of Failure Analysis of Components
  - Aircraft /Aerospace
  - Gas turbine engine components
  - Thermal power plant components
  - Railways, automotive components
  - Refineries
  - Petrochemical plants
  - Industrial machinery
  - Weldments.

**Level**

BE/MSc with 2 years experience

**No. of Participants**

20-30

**Duration**

8-12 October 2007

**Training Fees**

Rs. 10,000/- (Non-residential), Rs.15,000/- per participants (Residential)

**Coordinator(s) :**

Dr. S. R. Singh

**Title**

Failure Analysis

**About the Programme**

Failure of a component indicates it has become completely or partially unusable or has deteriorated to the point that it is undependable or unsafe for normal sustained service. Failure analysis and prevention are important functions to all of the engineering disciplines. The materials engineer often plays a lead role in the analysis of failures, whether a component or product fails in service or if failure occurs in manufacturing or during production processing. In any case, one must determine the cause of failure to prevent future occurrence, and/or to improve the performance of the component or structure. The training covers the following the topics consisting tutorials and hands-on experiments.

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  - Gas turbine engine components
  - Thermal power plant components
  - Railways, automotive components
  - Refineries
  - Petrochemical plants
  - Industrial machinery
  - Weldments.

**Level**

BE/MSc with 2 years experience

**No. of Participants**

20-30

**Duration**

8-12 October 2007

**Training Fees**

Rs. 10,000/- (Non-residential), Rs.15,000/- per participants (Residential)

**Coordinator(s) :**

Dr. S. R. Singh

**Title**

Non-destructive Testing of Metallic Materials

**About the Programme**

Following techniques will be covered in the training

- Ultrasonic
- Electromagnetic technique (Eddy Current, Magnetic Barkhausen Emission, Magnetic Hysteresis Loop)
- Acoustic Emission
- Radiography

The course will include theory, application, practical and procedures. It will also make reference to various standards and codes. The participants will get an opportunity to have hands on practice of the techniques during laboratory hours.

**Level**

Graduate/Post Graduate two years experience in the field of NDT

**No. of Participants**

20-30

**Duration**

8-12 October 2007

**Training Fees**

Rs. 10,000/- (Non-residential), Rs.15,000/- per participants (Residential)

**Coordinator(s) :**

Dr. N.Parida/ Dr.A.Mitra

**Title**

Mechanical Testing of Metallic Materials

**About the Programme**

National Metallurgical Laboratory, Jamshedpur has state-of-the-art infrastructure and facilities for mechanical testing and material properties evaluation, will provide a *hands-on* approach to mechanical testing. The programme will focus on the following mechanical tests: tensile, impact, creep and stress rupture high and low cycle fatigue, fatigue crack growth and fracture toughness. The emphasis will be on determination of mechanical properties of metallic materials. An outline of the topic coverage under the training programme is given below

<i>Topics</i>	<i>No. of hours</i>
Introduction to mechanical testing	1
Test standards for various tests being covered	5
Demonstration of testing machines operation	3
Transducers and machine calibration	3
Laboratory tests -demonstration and hands-on practice	
Tensile test	3
Impact test	3
Creep and Stress rupture tests	6
Low cycle and high cycle fatigue tests	4
Fatigue crack growth test	3
Fracture toughness ( $K_{IC}$ , $J_{IC}$ , CTOD) tests	6
Uncertainty and accuracy of mechanical tests	1
Feed back, clarifications and evaluation of the program	2

**Level**

Machine operators, quality control engineers and R&D personnel with an engineering or technical background

**No. of Participants**

20

**Duration**

19-23 November, 2007

**Training Fees**

Rs. 10,000/- per participants

**Coordinator(s) :**

Dr. J.Swaminathan/ Dr.S.Sivaprasad