



CSIR Integrated Skill India Initiative



Certificate Courses on Cryo-EM: Sample optimization, and 3D structure reconstruction

Code – IICB-CEM

Cryo-EM technique for 3D structure determination of biological macromolecules is now flourishing in India. The method proceeds through the following steps: 1. optimization of sample preparation and characterization, 2. sample vitrification (grid preparation), 3. image acquisition (in high resolution TEM at cryo condition), and 4. 3D-structure determination. While grid preparation and image collection (steps 2 and 3) can be outsourced (there are several facilities with paid services), appropriate sample preparation for structural studies (step 1) and 3D structure determination from the image dataset (step 4) need to be done in respective labs. Thus, persons having skills in these areas would be highly demanding.

Homogeneous sample preparation is a crucial step for high resolution cryo-EM structure determination. Following sample vitrification and image collection, the images need to be processed computationally. In this training course, we propose to provide training (a) to prepare specimen suitable for structural studies (step 1), (b) Single particle 3D reconstruction techniques to process the images (step 4).

Training Curriculum

➤ Purification of protein sample

Cloning in plasmid DNA

Transformation of the recombinant vector into the host bacteria for expression

Extraction and purification of protein

➤ Quality assessment of the sample

Gel electrophoresis (SDS-PAGE) and western blotting

Absorption behaviour of protein

CD and fluorescence spectroscopy

Column chromatography and light scattering

➤ 3D structure determination from a sample image dataset

Movie corrections

Screening the images

Step by step processing for 3D structure determination (Relion, EMAN2, Scipion)

2D and 3D classifications

Refinement of the structure

Model building





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- Educational Qualifications** : M.Sc. (or equivalent to masters), B.Tech., MBBS
- Venue Of the course** : CSIR-IICB, Jadavpur Campus
- Age group:** : 20-45 years (*relaxation for SC/ST/OBC as per GOI rules*)
- Course Fee** : **Rs. 6,000/-**
- Duration** : 2 weeks(27th Sept 2021 to 08thOct 2021)

Salient Features of the courses:

- Theory and practical sessions are per the course curriculum
- Hand-out information on teaching modules
- Lectures includes the entire process of routine clinical chemistry with multimedia aids
- Hands on training through several practical classes in laboratories
- Exposure to all relevant instruments
- Continuous assessment through theoretical assignments & practical examinations for evaluation
- A certificate will be issued to the successful candidates
- Seats Available : 05 (*Shortlisting will be based on first come-first serve policy and eligibility criteria of the course*)**
- Due to limited availability of seats, early registration through online application is recommended .
- Candidates can apply for multiple courses. In such cases, shortlisting will be based on fulfilment of eligibility conditions, availability of seat, number of single choice applicants for the course and choice preference provided by the candidate.
- Admission process is completely online including the payment of fees.
- Once a candidate is shortlisted for a particular course, any request for change of course will not be accepted .
- Candidates cannot take admission simultaneously in two different courses
- Only those candidates will be considered eligible for the course who have received at least single dose of COVID vaccination approved by Govt. of INDIA**

