UCEM
Umeå Core Facility
Electron Microscopy

Basic Course in SEM and TEM (1 ECTS)

18 - 20 February 2020

This course covers fundamental theory and operational principles as well as specimen preparation techniques for scanning and transmission electron microscopy (SEM/TEM).

The aim of this course is to provide general introduction of EM to research students, postdoctoral fellows and technical staff, who would like to work with EM methods in their projects. We accept participants from all research departments and universities and have no specific focus on research topics. This course includes lectures, laboratory demonstrations and microscope operation demonstrations. The TEM practical session will explain the preparation of EM grids, negative staining of proteins, plastic embedding of samples and sample sectioning by ultramicrotome. The SEM practical session covers introduction to both biological and materials science samples preparation. We will not have time to work on participants' samples during the course, but you are welcome to use the facility after undertaking proper EM training. **Please, only apply if you have time to participate for 3 full days.**

Location: Lectures at "Glasburen" KBC Building and laboratory demonstrations at UCEM - Level 5, 6 + EM building (Level 1), Umeå University.

Participants: 18 persons. Open to all research students, postdocs and staff.

Instructors from UCEM: Agnieszka Ziolkowska (AZ), Camilla Holmlund (CH), Linda Sandblad (LS), Michael Hall (MH), Nikki Lee (NL), Sara Henriksson (SH), Thomas Heidler (TH), Hussein Haggag (HH).

SciLife, Stockholm: **Dustin Morado** (DM)

Duration: 3 days

Breaks/Refreshments: Coffee, cookies and fruit will be served (**no lunch included**).

Credits: **1 ECTS** - Certificate will be given after participants attend all lectures and laboratory demonstrations for the 3-day course. Oral and practical examination during lab and EM demonstrations.

Website: http://www.umu.se/en/ucem

COURSE ITINERARY

2020-02-18 **TUESDAY**

SEM & TEM Lectures @ "Glasburen & Stora Fokusrummet" KBC

08:30 - 09:30 **Basic principles of SEM (NL)**

9:30 – 9:50 *Coffee*

09:50 - 10:50 **Specimen preparation for SEM (NL)**

10:50 - 11:50 **Basic principles of TEM, including introduction to negative staining (LS)**

12:00 – 12:55 *Lunchbreak (change to Stora Fokusrummet)*

13:00 - 13:50 **Specimen preparation for TEM: Introduction chemical fixation, plastic embedding, sectioning, staining, immunogold labeling on sections (AZ)**

13:50 - 14:40 **To be announced ()**

14:40 - 15:00 *Coffee*

15:00 - 16:00 **High pressure freezing including correlative microscopy methods, and FIB-SEM in biology and material science (NL, SH)**

16:00 - 16:30 **EM facility tour (SH, MH)**

2020-02-19 **WEDNESDAY**

EM Lab Demo: Specimen Preparation

08:30 - 10:00

Group 1: **Preparation of specimens for SEM (NL - KBC, UCEM Level 5)**

Group 2: **Ultramicrotome sectioning (AZ, SH - KBC, EM lab Level 1)**

Group 3: **Preparation of grids & negative staining (CH, MH - EM lab Level 1)**

10:30 - 12:00

Group 3: **Preparation of specimens for SEM (NL - KBC, UCEM Level 5)**

Group 1: **Ultramicrotome sectioning (AZ, SH - KBC, EM lab Level 1)**

Group 2: **Preparation of grids & negative staining (LS, MH - EM lab Level 1)**

13:00 - 14:30

Group 2: **Preparation of specimens for SEM (NL - KBC, UCEM Level 5)**

Group 3: **Ultramicrotome sectioning (AZ, SH - KBC, EM lab Level 1)**

Group 1: **Preparation of grids & negative staining (LS, CH - EM lab Level 1)**

SEM & TEM Lectures @ "Stora Fokusrummet" KBC

14:45 - 15:45 **Lecture: Electron tomography and acquisition of volumes by TEM (DM) - @ "Glasburen" KBC**

2020-02-20 THURSDAY
SEM & TEM Demonstrations

08:30 - 10:00

Group 1: **SEM @ Merlin (NL - KBC, UCEM Level 5)**

Group 2: **TEM @ Jeol (LS, AZ - KBC, UCEM Level 6)**

Group 3: **Electron tomography @ Talos (SH, CH - KBC, EM lab Level 1)**

10:30 - 12:00

Group 3: **SEM @ Merlin (NL - KBC, UCEM Level 5)**

Group 1: **TEM @ Jeol (LS, AZ - KBC, UCEM Level 6)**

Group 2: **Electron tomography @ Talos (SH, CH - KBC, EM lab Level 1)**

13:00 - 14:30

Group 2: **SEM @ Merlin (NL - KBC, UCEM Level 5)**

Group 3: **TEM @ Jeol (LS, AZ - KBC, UCEM Level 6)**

Group 1: **Electron tomography @ Talos (SH, CH - KBC, EM lab Level 1)**

SEM & TEM Lectures @ "Stora Fokusrummet" KBC

14:45 - 15:45 **Lecture: Cryo-EM and an introduction to single particle reconstruction (MH) - @ "Stora Fokusrummet" KBC**

15:45 - 16:30 **Course evaluation - @ "Stora Fokusrummet" KBC**

* For laboratory demonstrations (see group list below)

** Please inform the course instructors if your name is recorded incorrectly (your name will be printed on the Course Certificate).

*** Please take notice of the lecture room, demonstration laboratories and scheduled time for each lab.

**** Chemical Biological Centre (KBC) Building, Umeå University, Linnaeus väg 6, SE-90736 Umeå, Sweden. “Glasburen” is located at Level 3, KBC Building (next to KBC cafeteria).

GROUP	FIRST NAME	LAST NAME
1		

GROUP	FIRST NAME	LAST NAME
2		

3		