Course description MBI-8003, Correlative light and electron microscopy (CLEM) (5 ects)

Relevance for the PhD program training component:
The course is intended for PhD students who want to learn more about the modern use of electron microscopy and CLEM as research tools in medicine and biology.
The course is organized by the Department of Medical Biology, University of Tromsø (UoT) – The Arctic University of Norway. Course leader: Karen Kristine Sørensen; karen.sorensen@uit.no

The course is run by the EM and Bioimaging platforms in cooperation with national and international highly recognized experts in the field.

Travel grants: The Norwegian Research School in Medical Imaging (MedIm) provides travel grants for all participating PhD-students from other Norwegian universities. The grant covers travel expenses to and from Tromsø, and housing in Tromsø during the course. Contact MedIm for more information: www.medicalimaging.no .

Venue and time: University of Tromsø campus, **January 5-14, 2015**

Address for application: Information can be found on this link:
http://uit.no/ansatte/organisasjon/artikkel?p_menu=28713&p_document_id=61570&p_dimension_id=88108
Contact person, Faculty of Health Sciences, Research administration:
Monica Karlsen, e-mail: monica.karlsen@uit.no

Deadline for application: Will be announced early autumn 2014

Number of students: 12 - First apply-first served. Of note, 5 places will be reserved for PhD-students from Norwegian Universities outside Tromsø if enough external applicants.

Recommended prerequisites: None

Course description:

Intended outcomes:
Insights: Upon completion of this course the participants will be able to explain relevant modern methods and techniques using CLEM as research tools. This includes methods for pre-treatment, fixation, and preparation of cells and tissues for CLEM, the theoretical basis for transmission and scanning EM and confocal microscopy, and relevant methods for image analysis.
Expertise:
The students will obtain practical skills in different CLEM techniques, including:

- methods for pre-treatment, fixation, and preparation of samples for CLEM
- practical use of instruments
- image analysis

Qualifications: Basic competence to conduct experiments using CLEM as a method.

Contents:
The course will offer theoretical and practical training in state of the art techniques in correlative light and electron microscopy (CLEM). The teaching will be given as lectures, demonstrations, and practical sessions. Students are invited to work with own research material – within limitations. The following topics will be included:

- CLEM in medical and biological research – applications, instrumentation, sampling, probes
- Methods for detection/fine localization of proteins (on section, pre embedding, and by use of in vivo expressed tags)
- How to find the needle in the haystack - techniques to add landmarks on cells and bulk specimen
- Sample preparations for CLEM:
    1) Correlative light microscopy and transmission EM: i) The Tokuyasu technique; ii) high pressure freezing/freeze substitution, iii) microwave processing
    2) Correlative light microscopy and scanning EM
- Ultramicrotomy of resin-embedded and frozen specimens
- Immunolabeling of sections for light and electron microscopy , and special techniques for CLEM on cells and bulk specimen
- Flat embedding techniques and preparation of culture substrates for CLEM
- Transmission electron microscopy
- Scanning electron microscopy
- Confocal microscopy
- Image analysis

Description of learning methods:
Lectures, demonstrations, practical sessions. Teaching language: English.

Requirements:
Attendance at the course, including all lectures, demonstrations and laboratory exercises

Examination and assessment:
Home examination: graded pass or fail. The examination can be answered in Norwegian (or in another Scandinavian language) or English.

Supplementary exam:
There will be the option of one supplementary examination if a fail grade is achieved at the first attempt.