Syllabus

- Biomembranes & Cellular Microcompartments -

I. Course Details

Name: Biomembranes & Cellular Microcompartments
Date: July 6-29, 2018
Credits awarded: 5 ECTS
Primary language of Instruction: English
Necessary language level (as in B2, etc.): B2
Assessment: Lecture attendance, active participation in at least three practical courses (3 x 2 days), active participation in "Career Development Workshop"

II. Course Description

The School offers 16 international students a unique opportunity to acquire an integrated perspective on the biogenesis, dynamics and physiological functions of biomembranes and cellular microcompartments. In addition, students can explore their options for pursuing an academic career in Germany. The School is organized by the Natural Sciences Faculty at Osnabrück University (UOS), which combines a strong tradition in biomembrane research with the development of new technologies at the interface of nanoscience and cell biology.

III. Course Objectives

This Summer School offers a unique training program for international students to acquire an integrated perspective on the architecture, biogenesis, dynamics and, eventually, on the physiological functions of biomembranes and cellular microcompartments. The participants will gain direct insight into a wide array of experimental approaches and model systems to visualize microcompartments and elucidate their function and dynamics. Due attention will be paid on how the acquired knowledge provides a rationale for novel therapeutic interventions and applications in biotechnology. The program combines theory (lectures, tutorials) with experiment, laboratory tours and a scientific minisymposium organized by the International Training Group of the CRC944, bringing together Summer School participants with local faculty, PhD students and invited international guest speakers. The program also includes a career development workshop “Making your next move in/outside academia”, which is open to both international and local students to stimulate exchange of academic and cultural experiences across ethnic and geographical borders. Thus, all students participating in the program will benefit from great opportunities to build personal networks among each other as well as with (inter)national experts, which should have a long-lasting positive impact on their professional careers.

IV. Course Workload

Students need to attend lectures regularly. In addition, active participation in practical courses and a career development workshop is expected. The latter includes giving a short presentation. Literature representing the theoretical basis of the practical courses need to be read prior to attending the courses.

V. Course Content

For a detailed description of the course content, please consult the 2017 Summer School program.

UNIT / WEEK	*TOPIC*	*ACTIVITIES / STRATEGIES*
1	**Ultrastructural Organization of Biomembranes & Cellular Microcompartments** Gaining insight into how cellular microcompartments form and execute their specialized functions in the membrane, nucleus or cytosol of different cell types; non-invasive, fluorescent labeling of subcellular compartments in live animals; how the dynamic organization of biomolecules in microcompartments of live cells can be resolved in space & time by super-resolution fluorescence microscopy; cellular electron microscopy (EM) & latest practical developments in the field	Lectures, practical courses
2	**Biomembranes, Biomimetic Membranes & Microcompartments** Protein-lipid cross talk in biomembranes; mechanisms of membrane fusion at endomembranes; how peripheral membrane proteins are recruited to endomembranes; how maturation of endosomal organelles is regulated and sensed; how lysosomes are linked to other organelles via specialized membrane contact sites.	Lectures, practical courses, excursion
3	**Membrane Protein Structure, Dynamics & Crosstalk with Lipids** How E. coli controls the lipid composition & biophysical properties of its membranes; how cells maintain sphingolipid homeostasis; how defects in membrane trafficking impacts on subcellular sphingolipids pools, and how this may contribute to neurodegenerative disorders; how EPR spectroscopy can be used to monitor the dynamics of membrane proteins and lipids; how the evolution of biomembranes and the history of cellular systems can be reconstructed by combining phylogenomic and structural analyses	Lectures, practical courses, workshop, excursion