

NCMM Molecular Medicine Research Course

Course no.: MF9120BTS - Molecular Medicine (national PhD-level course)

Time: November 9-20, 2020

Place: Digital course via zoom ([see daily plan](#))

Organized by: Centre for Molecular Medicine Norway, Nordic EMBL Partnership, University of Oslo and Oslo University Hospital

Topics and Programme

1. **Disease mechanisms and development** (7 h)
 - a. Targeting signaling pathways in cancer (1h, Sigrid Skånland)
 - b. Inflammation (2h, Bente Halvorsen/Espen Melum)
 - c. Metabolic diseases, diabetes (1h, Pål Njølstad)
 - d. Epigenetics and chromatin structure (1h, Nikolina Sekulic)
 - e. DNA repair mechanisms (1h, Hilde Nilsen)
 - f. Disease mechanism and risk factors of venous thrombosis (1h, Lynn Butler)

2. **Animal models of disease** (3.5 h)
 - a. Stem cells and organoids (1h, Judith Staerk)
 - b. Disease mechanisms and animal models of cardiovascular disease (1.5h, Andreas Romaine /Arne Olav Melleby)
 - c. The use of zebrafish to model and understand mechanisms underlying neurological disorder (1h, Camila Esguerra)

3. **Biobanks, health registries and biomarker discovery** (4 h)
 - a. Use of population biobanks to understand human disease (1h, Kristian Hveem)
 - b. Predictive medicine: Use of health registries and epidemiology (1h, Trude E. Robsahm)
 - c. Cancer biomarkers (1h, Laxmi Silwal-Pandit)
 - d. Biomarkers for early diagnosis and management of heart diseases (1h, Torbjørn Omland)

4. **Imaging disease** (4 h)
 - a. Introduction to imaging modalities (1h, Lars Tore Gyland Mikalsen)
 - b. Imaging cardiovascular diseases in animal models and patients (2h, Bill Louch/Magnus Arnonsen)
 - c. Brain MR imaging in schizophrenia and bipolar disorder (1h, Ole Andreassen)

5. **Structure-based drug discovery** (4.5 h)
 - a. Basics of Chemical Biology and High throughput screening (0.5h, Johannes Landskron)

- b. Introduction to structural biology (1h, Hartmut Luecke)
 - c. Introduction to cryoEM in drug design (1h, Eva Cunha)
 - d. Drug development in the pharmaceutical industry (1h, Herbert Nar, BI)
 - e. Molecular dynamics studies (1h, Matteo Dal Peraro, EPFL)
6. **Tailored and personalized medicine** (7 h)
- a. Precision medicine in everyday practice - rare diseases (1h, Dag Undlien)
 - b. Precision cancer medicine, implementation and the IMPRESS-Norway trial (1h, Kjetil Taskén)
 - c. Drug sensitivity testing and personalized medicine (2h, Krister Wennerberg/ Bjørn Tore Gjertsen)
 - d. Utilizing common genetic variation to predict disease predisposition (2h, Samuli Ripatti, Elisabeth Widen)
 - e. Nano-medicine (1h, Irep Gözen)
7. **Advanced cell-based therapies** (4 h)
- a. Stem cells and their niche as a basis for future therapies (1h, Lorena Arranz)
 - b. Cell based therapies in medicine – Laboratory work flow and clinical practice in cancer treatment (1h, Else Marit Inderberg)
 - c. T cell receptor engineering and T cell therapies in cancer (1h, Johanna Olweus)
 - d. Stem cell treatment in diabetes (1h, Hanne Scholz)
8. **Computational biology** (6 h)
- a. Biostatistics and epidemiology (1h, Arnaldo Frigessi)
 - b. Single cell genomics (1h, Oliver Stegle)
 - c. Novel analytics in personalized medicine (2 h, Anthony Mathelier/Marieke Kuijjer)
 - d. Deep learning in biomedicine (1h, Esa Pitkänen)
 - e. Germline vs somatic mutations: commonalties, distinctions and interplay (1h, Sebastian Waszak)
9. **SARS-CoV-2 detection, vaccination and drug targeting** (2.5 h)
- a. SARS-CoV-2 – a study of replication and immunity (1h, Christine Hanssen Rinaldo, UiT)
 - b. Vaccine strategies (1h, Gunnveig Grødeland, KG Jebsen Center)
 - c. Inhibitor development for M^{pro}, the main protease of SARS-CoV-2 (0.5h, Joel Heim)
10. **Organizational**
- a. Introduction and organization (30 min, Elisa Bjørngo)

Week 1 Schedule; NCMM Molecular Medicine Research Course

Date	Room	Time	Topic	Title	Lecturer
09.11.2020	Zoom	09.10	Organizational	Info & organization	Elisa Bjørge
		09.25	BREAK		
09.11.2020	Zoom	09.30 – 10:15	Disease mechanisms	DNA repair mechanisms	Hilde Nilsen
		10.15 – 12.15	BREAK		
09.11.2020	Zoom	12.15 – 13.15	Disease mechanisms	Targeting signaling pathways in cancer	Sigrid Skånland
		13.15 – 14.00	BREAK		
09.11.2020	Zoom	14.00 – 15.00	Disease mechanisms	Metabolic diseases, diabetes	Pål Njølstad
10.11.2020	Zoom	09.00 – 09.45	Disease mechanisms	Epigenetics and chromatin structure	Nikolina Sekulic
		09.45 – 10.00	BREAK		
10.11.2020	Zoom	10.00 – 10.45	Tailored and personalized medicine	Precision cancer medicine, implementation and the IMPRESS-Norway trial	Kjetil Taskén
		10.45 – 11.15	BREAK		
10.11.2020	Zoom	11.15 – 12.00	Tailored and personalized medicine	Precision medicine in everyday practice - rare diseases	Dag Undlien
		12.00 – 13.45	BREAK		
10.11.2020	Zoom	13.45 – 14.30	Tailored and personalized medicine	Drug sensitivity testing and personalized medicine in leukemia	Krister Wennerberg
		14.30 – 14.45	BREAK		
10.11.2020	Zoom	14.45 – 15.30	Tailored and personalized medicine	Drug sensitivity testing and personalized medicine in leukemia	Bjørn Tore Gjertsen
11.11.2020	Zoom	09.15 – 10.00	Imaging disease	Introduction to imaging modalities	Lars Tore Gyland Mikalsen
		10.00 – 11.00	BREAK		
11.11.2020	Zoom	11.00 – 11.45	Imaging disease	Imaging cardiovascular diseases in animal models and patients	William Louch
		11.45 – 12.00	BREAK		
11.11.2020	Zoom	12.00 – 12.45	Imaging disease	Imaging cardiovascular diseases in animal models and patients	Magnus Aronsen
		12.45 – 14.00	BREAK		
11.11.2020	Zoom	14.00 – 14.45	Disease mechanisms	Inflammation - the fuel in atherosclerosis	Bente Halvorsen
		14.45 – 15.00	BREAK		
11.11.2020	Zoom	15.00 – 15.45	Disease mechanisms	Gut and liver inflammation	Espen Melum

12.11.2020	Zoom	09.00 – 10.00	Animal models of disease	Stem cells and organoids	Judith Staerk
		10.00 – 11.00	BREAK		
12.11.2020	Zoom	11.00 – 11.45	Animal models of disease	Disease mechanisms and animal models of cardiovascular disease	Andreas Romaine
		11.45 – 12.00	BREAK		
12.11.2020	Zoom	12.00 – 12.30	Animal models of disease	Disease mechanisms and animal models of cardiovascular disease	Arne Olav Melleby
		12.30 – 13.45	BREAK		
12.11.2020	Zoom	13.45 – 14.30	Advanced cell-based therapies	Stem cells and their niche as a basis for future therapies	Lorena Arranz
		14.30 – 14.45	BREAK		
12.11.2020	Zoom	15.00 – 15.45	Tailored and personalized medicine	Nano-medicine	Irep Gözen
13.11.2020	Zoom	09.15 – 10.15	Disease mechanisms	Disease mechanism and risk factors of venous thrombosis	Lynn Butler
		10.15 – 11.00	BREAK		
13.11.2020	Zoom	11.00 – 11.45	Animal models in disease	The use of zebrafish to model and understand mechanisms underlying neurological disorder	Camila Esguerra
		11.45 – 13.00	BREAK		
13.11.2020	Zoom	13.00 – 13.45	Tailored and personalized medicine	Genomics in Disease Prevention and Management	Samuli Ripatti
		13.45 – 14.00	BREAK		
13.11.2020	Zoom	14.00 – 14.45	Tailored and personalized medicine	Genomics in Action: Preventing Ischemic Heart Disease	Elisabeth Widen

Week 2 Schedule; NCMM Molecular Medicine Research Course

Date	Room	Time	Topic	Title	Lecturer
16.11.2020	zoom	09.15 – 10.15	Advanced cell-based therapies	Cell based therapies – Laboratory work flow and clinical practice	Else Marit Inderberg
		10.15 – 11.00	BREAK		
16.11.2020	zoom	11.00 – 11.45	Biobanks, health registries and biomarker discovery	Cancer biomarkers: from discovery to clinical practice	Laxmi Silwal-Pandit
		11.45 – 12.00	BREAK		
16.11.2020	zoom	12.00 – 12.45	Advanced cell- based therapies	Stem cell treatment in diabetes	Hanne Scholz
		12.45 – 14.00	BREAK		
16.11.2020	zoom	14.00 – 15.00	Imaging disease	Brain MR imaging in schizophrenia and bipolar disorder	Ole Andreassen

17.11.2020	zoom	09.00 – 09.45	Computational Biology	Covid-19 and mathematical models	Arnoldo Frigessi
		09.45 – 10.00	BREAK		
17.11.2020	zoom	10.00 – 10.45	Computational Biology	Single cell genomics	Oliver Stegle
		10.45 – 11.15	BREAK		
17.11.2020	zoom	11.15 – 12.00	Computational Biology	Novel analytics in personalized medicine	Anthony Mathelier
		12.00 – 12.15	BREAK		
17.11.2020	zoom	12.15 – 13.00	Computational Biology	Novel analytics in personalized medicine	Marieke Kuijjer
		13.00 – 14.00	BREAK		
17.11.2020	zoom	14.00 – 14.45	Computational Biology	Deep learning in biomedicine	Esa Pitkänen
		14.45 – 15.00	BREAK		
17.11.2020	zoom	15.00 – 15.45	Computational Biology	Germline vs somatic mutations: commonalities, distinctions and interplay	Sebastian Waszak
18.11.2020	zoom	09.15 – 10.00	Structure-based drug discovery	Introduction to structural biology	Hartmut Luecke
		10.00 – 10.15	BREAK		
18.11.2020	zoom	10.15 – 10.45	Structure-based drug discovery	Basics of Chemical Biology and High throughput screening	Johannes Landskron
		10.45 – 11.15	BREAK		
18.11.2020	zoom	11.15 – 12.15	Structure-based drug discovery	Introduction to cryoEM in drug design	Eva Cunha
		12.15 – 14.00	BREAK		
18.11.2020	zoom	14.00 – 14.45	Structure-based drug discovery	Molecular dynamics studies	Matteo Dal Peraro
		14.45 – 15.00	BREAK		
18.11.2020	zoom	15.00 – 15.45	Structure-based drug discovery	The Role of Structural Biology and Biophysics in Drug Discovery	Herbert Nar
19.11.2020	zoom	09.15 – 10.15	Biobanks, health registries and biomarker discovery	Predictive medicine: Use of health registries and epidemiology	Trude Eid Robsahm
		10.15 – 11.00	BREAK		
19.11.2020	zoom	11.00 – 12.00	Biobanks, health registries and biomarker discovery	Biomarkers for early diagnosis and management of heart diseases	Torbjørn Omland
		12.00 – 14.00	BREAK		
19.11.2020	zoom	14.00 – 15.00	Biobanks, health registries and biomarker discovery	Use of population biobanks to understand human disease	Kristian Hveem
20.11.2020	zoom	09.00 – 09.45	SARS-CoV-2 detection, vaccination and drug targeting	SARS-CoV-2 – a study of replication and immunity	Christine H. Rinaldo
		09.45 – 10.00	BREAK		

20.11.2020	zoom	10.00 – 10.30	SARS-CoV-2 detection, vaccination and drug targeting	Inhibitor development for M ^{pro} , the main protease of SARS-CoV-2	Joel Heim
		10.30 – 11.00	BREAK		
20.11.2020	zoom	11.00 – 11:45	SARS-CoV-2 detection, vaccination and drug targeting	Vaccine strategies	Gunnveig Grødeland
		11.45 – 12.15	BREAK		
20.11.2020	zoom	12.15 – 13.00	Advanced cell- based therapies	T cell-based immunotherapy in cancer	Johanna Olweus
20.11.2020	zoom	13.00	Organizational	Summary course	Elisa Bjørgo