

NCMM Molecular Medicine Research Course

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

Time: November 8-19, 2021

Place: Oslo Science Park, Level 0, Hagen 1+2 ([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** (8h)
 - a. Targeting signaling pathways in cancer (1h, Sigrid Skånland)
 - b. Inflammation (2h, Guttorm Haraldsen/Espen Melum)
 - c. Metabolic diseases, diabetes (2h, 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** (4h)
 - a. Stem cells (2h, Judith Staerk)
 - b. Disease mechanisms and animal models of cardiovascular disease (1h, Andreas Romaine)
 - c. The use of zebrafish to model and understand mechanisms underlying neurological disorder (1h, Camila Esguerra)

3. **Biobanks, health registries and biomarker discovery** (7 h)
 - a. Use of population biobanks to understand human disease (2h, Kristian Hveem)
 - b. Predictive medicine: Use of health registries and epidemiology (2h, Trude E. Robsahm)
 - c. Cancer biomarkers (1h, Helga Bergholtz)
 - d. Biomarkers for early diagnosis and management of heart diseases (2h, Torbjørn Omland)

4. **Imaging disease** (6h)
 - a. Introduction to imaging modalities (1h, Lars Tore Gyland Mikalsen)
 - b. Translational Molecular Imaging in Cancer (1h, Emmet Mc Cormack)
 - c. Imaging cardiovascular diseases in animal models and patients (2h, Bill Louch/Magnus Arnonsen)
 - d. Brain MR imaging in schizophrenia and bipolar disorder (2h, Ole Andreassen)

5. **Structure-based drug discovery** (5h)
 - a. Introduction to structural biology and cryoEM in drug design (2h, Eva Cunha)

- b. Basics of Chemical Biology and High throughput screening (1h, Johannes Landskron)
- c. Drug development in the pharmaceutical industry (1h, Herbert Nar, BI)
- d. Molecular dynamics studies (1h, Matteo Dal Peraro, EPFL)

6. **Tailored and personalized medicine** (9h)

- a. Introduction to Precision Medicine (1h, Janna Saarela)
- b. Precision cancer medicine, implementation and the IMPRESS-Norway trial (1h, Kjetil Taskén)
- c. Precision medicine in everyday practice - rare diseases (1h, Dag Undlien)
- d. Drug sensitivity testing and personalized medicine (2h, Krister Wennerberg/ Bjørn Tore Gjertsen)
- e. Utilizing common genetic variation to predict disease predisposition (2h, Samuli Ripatti, Elisabeth Widen)
- f. Lipid vesicles and lipid nanoparticles for drug delivery and vaccination (1h, Irep Gözen)

7. **Advanced cell-based therapies** (5h)

- 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 (2h, 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** (7h)

- a. Computational Biology of Adaptive Immunity (1h, Victor Greiff)
- 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)
- f. Covid-19 and mathematical models (1h, Arnaldo Frigessi)

9. **SARS-CoV-2 detection, vaccination and drug targeting** (3 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)

10. **Organizational**

- a. Introduction and organization (1h, Elisa Bjørngo)

Week 1 Schedule; NCMM Molecular Medicine Research Course

Date	Day/Room	Time	Topic	Title	Lecturer
08.11.2021	Mon Hagen 1+2	09.00 – 09.15	Organizational	Info & organization	Elisa Bjørge
08.11.2021	Mon Hagen 3	09.15 – 11.00	Disease mechanisms	- DNA repair mechanisms - Epigenetics and chromatin structure	- Hilde L. Nilsen - Nikolina Sekulic
08.11.2021	Mon Hagen 1+2	11:15 – 13:00	TBD	TBD	TBD
08.11.2021	Mon Hagen 1+2	14.00 – 15.45	Disease mechanisms	- Targeting signaling pathways in cancer - Disease mechanism and risk factors of venous thrombosis	- Sigrid Skånland - Lynn Butler
09.11.2021	Tue Hagen 1+2	09.00 – 10.45	Disease mechanisms	- Introduction to inflammation - Gut and liver inflammation	- Guttorm Haraldsen - Espen Melum
09.11.2021	Tue Hagen 1+2	11.00 – 12.45	Animal models of disease	Stem cells	Judith Staerk
09.11.2021	Tue Hagen 1+2	14.00 – 15.45	- Animal models in disease	- The use of zebrafish to model and understand mechanisms underlying neurological disorder - Disease mechanisms and animal models of cardiovascular disease	- Camila Esguerra - Andreas Romaine (zoom!)
10.11.2021	Wed Hagen 1+2	09.00 – 10.45	Imaging disease	- Introduction to imaging modalities - Translational Molecular Imaging in Cancer	- Lars Tore Gyland Mikalsen - Emmet Mc Cormack
10.11.2021	Wed Hagen 1+2	11.00 – 12.45	Imaging disease	Imaging cardiovascular diseases in animal models and patients	Bill Louch/ Magnus Aronsen
10.11.2021	Wed Hagen 1+2	14.00 – 15.45	Imaging disease	Brain MR imaging in schizophrenia and bipolar disorder	Ole Andreassen
11.11.2021	Thu Hagen 1+2	09.00 – 10.45	Advanced cell-based therapies	Cell based therapies – Laboratory work flow and clinical practice	Else Marit Inderberg
11.11.2021	Thu Hagen 1+2	11.00 – 12.45	- Advanced cell- based therapies	- T cell-based immunotherapy in cancer - Stem cell treatment in diabetes	- Johanna Olweus - Hanne Scholz
11.11.2021	Thu Hagen 1+2	14.00 – 15.45	- Advanced cell-based therapies	- Stem cells and their niche as a basis for future therapies - TBD	- Lorena Arranz - TBD
12.11.2021	Fri Hagen 1+2	09.00 – 10.45	Computational Biology	- Computational Biology of Adaptive Immunity - Single cell genomics (zoom lecture)	- Victor Greiff - Oliver Stegle
12.11.2021	Fri Hagen 1+2	11.00 – 12.45	Computational Biology	Novel analytics in personalized medicine	Anthony Mathelier/ Marieke Kuijjer
12.11.2021	Fri Hagen 1+2	13.30 – 15.15	Computational Biology	- Deep learning in biomedicine	- Esa Pitkänen

				- Germline vs somatic mutations: commonalities, distinctions, and interplay	- Sebastian Waszak
--	--	--	--	---	--------------------

Week 2 Schedule; NCMM Molecular Medicine Research Course

Date	Day/Room	Time	Topic	Title	Lecturer
15.11.2021	Mon Hagen 1+2	09.00 – 10.45	Tailored and personalized medicine	- Introduction to Precision Medicine - Precision cancer medicine, implementation and the IMPRESS-Norway trial	- Janna Saarela - Kjetil Taskén
15.11.2021	Mon Hagen 1+2	11.00 – 12.45	Tailored and personalized medicine	- Precision medicine in everyday practice - rare diseases - Lipid vesicles and lipid nanoparticles for drug delivery and vaccination	- Dag Undlien - Irep Gözen
15.11.2021	Mon Hagen 1+2	14.00 – 15.45	Tailored and personalized medicine (zoom if necessary)	Drug sensitivity testing and personalized medicine in leukemia	Krister Wennerberg/ Bjørn Tore Gjertsen
16.11.2021	Tue Hagen 1+2	09.00 – 10.45	Tailored and personalized medicine (online/zoom)	- Genomics in Disease Prevention and Management - Genomics in Action: Preventing Ischemic Heart Disease	- Samuli Ripatti - Elisabeth Widen
16.11.2021	Tue Hagen 1+2	11.00 – 12.45	Biobanks, health registries and biomarker discovery	Predictive medicine: Use of health registries and epidemiology	Trude Eid Robsahm
16.11.2021	Tue Hagen 1+2	14.00 – 15.45	Biobanks, health registries and biomarker discovery	Use of population biobanks to understand human disease	Kristian Hveem
17.11.2021	Wed Hagen 1+2	09.00 – 10.45	Biobanks, health registries and biomarker discovery	Biomarkers for early diagnosis and management of heart diseases	Torbjørn Omland
17.11.2021	Wed Hagen 1+2	11.00 – 12.45	- Biobanks, health registries and biomarker discovery	- Cancer biomarkers: from discovery to clinical practice - TBD	- Helga Bergholtz - TBD
17.11.2021	Wed Hagen 1+2	14.00 – 15.45	Disease mechanisms	Metabolic diseases, diabetes	Pål Njølstad
18.11.2021	Thu Hagen 1+2	09.00 – 10.45	Structure-based drug discovery	- Introduction to structural biology and cryoEM in drug design	- Eva Cunha
18.11.2021	Thu Hagen 1+2	11.00 – 12.45	Structure-based drug discovery (online/zoom)	- Molecular dynamics studies - The Role of Structural Biology and Biophysics in Drug Discovery	- Matteo Dal Peraro - Herbert Nar

18.11.2021	Thu Hagen 1+2	14.00 – 15.45	Structure-based drug discovery	- Basics of Chemical Biology and High throughput screening - TBD	- Johannes Landskron - TBD
19.11.2021	Fri Hagen 1+2	09.00 – 10.45	SARS-CoV-2 detection, vaccination and drug targeting	- SARS-CoV-2 – a study of replication and immunity - Vaccine strategies	- Christine H. Rinaldo - Gunnveig Grødeland
19.11.2021	Fri Hagen 1+2	11.15 – 12:00	- Computational Biology	- Covid-19 and mathematical models	- Arnaldo Frigessi
19.11.2021	Fri Hagen 1+2	12.00	Organizational	Summary course & Pizza	Elisa Bjørge