

# SCIENCES CLINIQUES ET MÉDECINE TRANSLATIONNELLE (CTM)

## Les cours en sciences cliniques et médecine translationnelle (CTM) sont offerts par la Faculté de médecine

### CTM 7101 MSc Seminar (3 units)

Compulsory for all students enrolled in the master program. Presentation of two seminars or one seminar and one poster required during the year as well as regular attendance at the CTM seminar series.

**Course Component:** Seminar

### CTM 71011 MSc Seminar (Part 1 of 2)

Compulsory for all students enrolled in the master program. Presentation of two seminars or one seminar and one poster required during the year as well as regular attendance at the CTM seminar series. (Part 1 of 2)

**Course Component:** Seminar

### CTM 71012 MSc Seminar (Part 2 of 2) (3 units)

Compulsory for all students enrolled in the master program. Presentation of two seminars or one seminar and one poster required during the year as well as regular attendance at the CTM seminar series. (Part 2 of 2)

**Course Component:** Seminar

Prerequisite: CTM 71011.

### CTM 7102 MSc with Research Project Entrustable Professional Activities

**Course Component:** Research

### CTM 7103 Research Project (6 units)

Obligatoire pour tous les étudiants inscrits au programme de maîtrise basé sur le projet de recherche. Les candidats au MSc s'engageront dans un projet de recherche en laboratoire de 8 mois guidé par un membre du corps professoral, englobant le développement de questions de recherche, la conception expérimentale, l'acquisition des données et la rédaction scientifique. Ce projet expérientiel favorise le développement des compétences essentielles, aboutissant à un rapport de projet sous la forme d'un court article de journal/ Compulsory for all students enrolled in the research project based master program. MSc candidates will engage in an 8-month laboratory research project guided by faculty member, encompassing research question development, experimental design, data handling, and science writing. This experiential project fosters core skill development, culminating in a project report in the format of a short journal article.

**Course Component:** Research

### CTM 7104 MSc Thesis Entrustable Professional Activities

**Course Component:** Research

### CTM 7105 Stage / Internship (6 units)

Expérience pratique et exécution d'un projet ayant trait aux sciences cliniques et médecine translationnelle, sous la supervision d'un membre du corps professoral. Noté S (satisfaisant) ou NS (non satisfaisant) à partir d'un rapport de stage écrit et des résultats du stage. / Practical experience and completion of a project related to clinical science and translational medicine, under the supervision of a faculty member. Graded S (Satisfactory) / NS (Not satisfactory) based on a written report on the project, and on performance during the internship.

**Course Component:** Practicum

### CTM 7501 MSc Séminaire (3 crédits)

Obligatoire pour tous les étudiants inscrits au programme de maîtrise. Présentation de deux séminaires ou un séminaire et un poster requis au cours de l'année, ainsi qu'une participation régulière à la série de séminaires MCT.

**Volet :** Séminaire

### CTM 8101 Research Methods and Experimental Design (3 units)

Introduction to fundamentals of CTM, basic biostatistics, and experimental design in clinical and translational research.

**Course Component:** Lecture

### CTM 8102 PhD Seminar (3 units)

Compulsory for all students enrolled in the doctorate program. Presentation of two seminars or one seminar and one poster required during the year as well as regular attendance at the CTM seminar series.

**Course Component:** Seminar

### CTM 81021 PhD Seminar (Part 1 of 2)

Compulsory for all students enrolled in the doctorate program. Presentation of two seminars or one seminar and one poster required during the year as well as regular attendance at the CTM seminar series. (Part 1 of 2)

**Course Component:** Seminar

### CTM 81022 PhD Seminar (Part 2 of 2) (3 units)

Compulsory for all students enrolled in the doctorate program. Presentation of two seminars or one seminar and one poster required during the year as well as regular attendance at the CTM seminar series. (Part 2 of 2)

**Course Component:** Seminar

Prerequisite: CTM 81021.

### CTM 8103 Comprehensive Examination (PhD)

**Course Component:** Research

### CTM 8104 PhD Entrustable Professional Activities

**Course Component:** Research

### CTM 8105 Advanced Focused Topics in Basic and Clinical Cardiovascular Medicine (3 units)

Advanced exposure to focused topics in Cardiovascular Medicine on either electrophysiology, coronary artery disease, heart function, myocardial disorders, or valvular disorders.

**Course Component:** Lecture

### CTM 8106 Advanced Topics in Cardiovascular Medicine (3 units)

Advanced mechanisms in Cardiovascular Medicine and survey of cardiac electrophysiology, cardiac pathology, coronary artery disease, heart function, myocardial disorders, and valvular disorders.

**Course Component:** Lecture

### **CTM 8107 Introduction to Radiation Sciences (3 units)**

Introduction of classical radiobiology concepts and their clinical applications through relevant calculations and hands-on experience with state-of-the-art equipment and simulation tools.

**Course Component:** Lecture

### **CTM 8108 Introduction to Medical Imaging Physics (3 units)**

Introduction of the principles and clinical applications of various medical imaging modalities, the physics of image formation, equipment, safety, image reconstruction, through hands-on experience with state-of-the-art imaging equipment.

**Course Component:** Lecture, Seminar

### **CTM 8109 Introduction to AI & Machine Learning in medical imaging (3 units)**

Introduction to AI in medical imaging, focusing on quantitative feature extraction, machine learning, and deep learning. Emphasis on experimental design and rigorous analysis of results.

**Course Component:** Lecture, Seminar

### **CTM 8110 Advanced Topics in Magnetic Resonance Imaging and Spectroscopy (3 units)**

Advanced study of Magnetic Resonance Imaging and Spectroscopy with a focus on relaxation theory, k-space, pulse sequence design, sequence optimization, image reconstruction, MR spectroscopy, diffusion imaging, perfusion imaging, quantitative susceptibility MR, accelerated imaging, high-field, and hybrid PET-MR.

**Course Component:** Lecture, Seminar

### **CTM 8111 Special Topics in Image Processing (3 units)**

Introduction to current applications of processing utilities and scientific computing tools. Study of image processing in medical imaging, covering file-format conversion, registration, error correction, data fitting, and tissue segmentation.

**Course Component:** Lecture

### **CTM 8112 Special Topics in Radiation Oncology (3 units)**

Study of radiation oncology physics with a focus on clinical applications and advanced technologies for graduate students.

**Course Component:** Lecture

### **CTM 8113 Special Topics in Cardiac Computed Tomography and Magnetic Resonance Imaging (3 units)**

Study of recent advances in imaging, including cardiac imaging in CT and MRI. Examine the basics of MR and CT physics, CT and MR instrumentation, calcium scoring, non-invasive coronary angiography, cardiac anatomy, function, viability and perfusion imaging, and valvular abnormalities.

**Course Component:** Lecture, Seminar

### **CTM 8114 Special Topics in Cardiac Nuclear Imaging (3 units)**

Study of advances in cardiac nuclear imaging and the technologies, techniques and clinical indicators in cardiac nuclear imaging including basics of radiation physics, SPECT and PET.

**Course Component:** Lecture, Seminar

### **CTM 8115 Quality Improvement (QI) Methods (3 units)**

Introduction to the TOH Innovation Framework for healthcare improvement and innovation, including case examples of QI tools such as problem analysis, root cause analysis, process monitoring, PDSAs, and methods for sustaining and evaluating an improvement initiative.

**Course Component:** Lecture

### **CTM 8116 Patient Safety (3 units)**

Introduction to quality and safety legislation, patient safety methods, Just Culture, safety measurement systems, safety interventions, and human factors.

**Course Component:** Lecture

### **CTM 8117 Variation and Statistical Process Control (3 units)**

Introduction to variation theory and process assessment methods, with a focus on run charts and control charts and their relevance to quality outcomes.

**Course Component:** Lecture

### **CTM 8118 Advanced topics in microbiome and drug development (3 units)**

Advanced study of recent developments in human microbiome impacts on health and disease, and the development of therapeutics targeting the gut microbiome, and the development of microbiome based assays.

**Course Component:** Lecture

### **CTM 8119 Advanced topics in Targeted Pharmacotherapy in Oncology (3 units)**

Introduction to the drug development process in oncology covering the discovery, preclinical and clinical phases, clinical trial conduct, approved anti-cancer drugs including chemotherapy, targeted therapies, and immunotherapies. The course also includes biomarker usage in patient selection for treatment and new therapeutic strategies.

**Course Component:** Lecture

### **CTM 8120 Advanced topics monoclonal Antibodies in Therapy (3 units)**

Advanced study of the history, current state, and future of mAb therapy including the hybridoma method, antibody engineering, the translation of mAbs to the clinic, as well as study of mAbs as direct drugs or delivery agents for cytotoxic small molecules.

**Course Component:** Lecture

### **CTM 8121 Advanced topics Antibody-drug conjugates (3 units)**

Advanced study of the history, present status, and future of antibody-drug conjugates (ADCs), providing students with an understanding of their construction and technical challenges. Examination of preclinical and clinical trial design and methodology, as well as regulatory and economic aspects of ADC therapy.

**Course Component:** Lecture

### **CTM 8122 Advanced topics in The Cell Nucleus in Pharmaceuticals (3 units)**

Advanced study of the structure and function of the cell nucleus and its relevance to pharmaceuticals, including nuclear transport as a pharmacological target and current/future perspectives for pharmacological targeting of the nucleus.

**Course Component:** Lecture

### **CTM 8123 Advanced topics in the Treatments of skeletal muscle diseases (3 units)**

Advanced study of diseases affecting the musculoskeletal system and current therapies, including non-surgical management therapies including emerging drugs and nutritional strategies, for treating myopathies.

**Course Component:** Lecture

### **CTM 8124 Advanced topics in Integrative Nutrition (3 units)**

Advanced study of recent advances in selected areas of nutritional compounds and their roles in the pathogenicity and treatments these diseases.

**Course Component:** Lecture

### **CTM 8125 Special topics in pharmacology (3 units)**

Advanced study of the recent advances in selected areas of pharmacology.

**Course Component:** Lecture

### **CTM 8126 Special topics in drug development (3 units)**

Advanced study of the recent advances in selected areas of drug development.

**Course Component:** Lecture

### **CTM 8127 Special topics in human microbiome (3 units)**

Advanced study of the recent advances in selected areas of human microbiome.

**Course Component:** Lecture

### **CTM 8128 Special Topics in Neuroimaging (3 units)**

Introduction to the scientific and technical foundations of neuroimaging and a focus on data acquisition, research study design, and analysis methods for various neuroimaging modalities.

**Course Component:** Lecture

### **CTM 8129 Advanced Topics in Psychiatry (3 units)**

Advanced study of recent progress in psychiatry and clinical neuroscience, examination of psychosocial, biological, developmental, experiential, and environmental factors impact behavior, symptoms, and treatment.

**Course Component:** Lecture

### **CTM 8130 Special Topics in Interdisciplinary Social Studies in Medicine (3 units)**

Advanced study of interdisciplinary social research while embedded in clinical settings.

**Course Component:** Seminar

### **CTM 8131 Advanced topics in the Treatments of degenerative Musculo-skeletal diseases (3 units)**

Advanced study of diseases affecting the musculoskeletal system focusing on degenerative conditions of osteo-articular joints and tendons discussing surgical management ie. Osteotomies, cartilage grafts and joint replacements.

**Course Component:** Lecture

### **CTM 81311 Advanced topics in the Treatments of degenerative Musculo-skeletal diseases (Part 1 of 2)**

Advanced study of diseases affecting the musculoskeletal system focusing on degenerative conditions of osteo-articular joints and tendons discussing surgical management ie. Osteotomies, cartilage grafts and joint replacements. (Part 1 of 2)

**Course Component:** Lecture

### **CTM 81312 Advanced topics in the Treatments of degenerative Musculo-skeletal diseases (Part 2 of 2) (3 units)**

Advanced study of diseases affecting the musculoskeletal system focusing on degenerative conditions of osteo-articular joints and tendons discussing surgical management ie. Osteotomies, cartilage grafts and joint replacements. (Part 2 of 2)

**Course Component:** Lecture

### **CTM 8132 Advanced topics in Joint Biomechanics and Biomaterials (3 units)**

Advanced study of the principles of joint mechanics essential for normal joint function as well as factors leading to joint malfunction/pain and properties of biomaterials.

**Course Component:** Lecture

### **CTM 8133 Advanced topics in infections affecting the MSK system (3 units)**

Advanced study of infections post-surgical interventions after trauma or joint replacement surgery focusing on the patho-mechanisms as well as antibiotic and surgical treatments.

**Course Component:** Lecture

### **CTM 8134 Directed studies in clinical and translational medicine (3 units)**

Individual course aimed at deepening the student's knowledge in a specific area of clinical and translational medicine.

**Course Component:** Lecture

### **CTM 8135 Special Topics in Cardiac Magnetic Resonance Imaging (3 units)**

Study of recent advances in cardiac imaging in MRI. Examine the basics of MR physics, MR instrumentation, non-invasive coronary angiography, cardiac anatomy, function, myocardial characterization, viability and perfusion imaging, valvular abnormalities, and tissue characterization. Course Component:#Lecture, Seminar Pre-requisite(s): By permission of the course coordinator.

**Course Component:** Lecture

### **CTM 8501 Études dirigées en médecine clinique et translationnelle (3 crédits)**

Cours individuel ayant pour objectif d'approfondir les connaissances de l'étudiant dans un domaine particulier de la médecine clinique et translationnelle.

**Volet :** Cours magistral

### **CTM 8502 PhD Séminaire (3 crédits)**

Obligatoire pour tous les étudiants inscrits au programme de doctorat. Présentation de deux séminaires ou un séminaire et un poster requis au cours de l'année, ainsi qu'une participation régulière à la série de séminaires MCT.

**Volet :** Séminaire