

At Bruxelles Woluwe - 60 credits - 1 year - Day schedule - In EnglishDissertation/Graduation Project : **YES** - Internship : **NO**Activities in English: **YES** - Activities in other languages : **NO**Activities on other sites : **YES**Main study domain : **Sciences biomédicales et pharmaceutiques**Organized by: **Faculty of Pharmacy and Biomedical Sciences (FASB)**Programme acronym: **PMTX2MC** - Francophone Certification Framework: 7**Table of contents**

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PMTX2MC - Introduction

Introduction

Introduction



This program, the Master of Pharmacometrics, is a joint effort by KULeuven and UCLouvain, aiming to attract candidates from diverse academic backgrounds such as pharmaceutical sciences, biomedical sciences, medicine, statistics, and more. It offers the opportunity to specialize in the fast-growing field of pharmacometrics and prepares graduates for roles in the pharmaceutical industry, hospitals, the public sector, or scientific research. Both institutions have heavily invested in building solid research foundations in pharmacometrics. They aim to leverage this expertise to train candidates in collaboration with experts from industry, hospitals, and the public sector. By choosing a joint program, the teams from both universities complement and strengthen each other, ensuring high-level training.

Pharmacometrics is the science of developing and applying statistical models to predict the behavior of drugs in the human body. These models can determine the potential effects and side effects of drugs, including in specific patient groups such as those who are obese or have liver or kidney failure. By mathematically modeling these effects, predictions can be made about drugs still in development, guiding the development process. Pharmacometric models help ensure targeted drug development, reducing the need for studies on laboratory animals or large groups of patients. In clinical practice, these models are crucial for making informed decisions about drug choice and dosage tailored to individual patient characteristics. Information from pharmacometric models is essential for making sound decisions regarding drug approval and reimbursement.

Your profile

The Master of Pharmacometrics program at KULeuven and UCLouvain is designed for individuals with diverse academic backgrounds, including pharmaceutical sciences, biomedical sciences, medicine, and statistics. The program is also open to holders of a master's degree in (bio-)engineering, biology, chemistry, statistics, epidemiology, mathematics, physics, or any other related discipline (see access criteria).

Ideal candidates are eager to specialize in the fast-growing field of pharmacometrics, aiming to make significant contributions to the pharmaceutical industry, hospitals, public sector, or scientific research. Candidates should have a particular interest in pharmacology, pharmacotherapy, as well as mathematics, biostatistics, and modeling approaches. You will benefit from the robust research and mentorship provided by both institutions, learning from leading experts and collaborating with professionals from various sectors. This program promotes student autonomy, encouraging you to take initiative and develop independent research skills.

Motivated by the potential to impact drug development and clinical practice, ensuring safer and more effective treatments tailored to individual patient needs, this program is for those looking to advance their careers and make a difference in the world of healthcare.

Your future job

As a pharmacometrician, you will apply quantitative methods to study the behavior and effects of drugs in humans (and, possibly, animals). You will work in various settings, including pharmaceutical companies, academic institutions, contract research organizations, and regulatory agencies. Your main responsibilities will include developing and validating pharmacokinetic and pharmacodynamic models, which describe how drugs are absorbed, distributed, metabolized, and eliminated in the body, as well as how they interact with biological targets to produce responses.

Additionally, you will perform population pharmacokinetic (popPK) and pharmacokinetic/pharmacodynamic analyses to account for variability in drug exposure and response among different individuals or groups. You will design, conduct, and interpret simulations and scenarios based on these models to optimize drug development strategies, trial designs, dosing regimens, and extrapolations across populations or indications.

Finally, you will communicate your findings to internal and external stakeholders, including project teams, management, clinicians, and regulators, ensuring that your insights contribute to the advancement of safe and effective drug therapies.

Your programme

The program of 60 ECTS is structured around 4 blocks that follow the logical workflow of constructing a pharmacometric model and is taught in English. Each block will conclude with an integrative group project. Each block consists of 15 ECTS. An overview of the full program with a detailed list of the different courses in each block is given in the [dedicated section](#).

Block 1			
WPMTX2001	Drug life cycle	3	q1
WPMTX2002	Concepts of Multilevel, Longitudinal and Mixed Models	5	q1&2
WPMTX2003	Basic concepts of pharmacokinetics and pharmacodynamics	5	q1
WPMTX2004	Data management	4	q1
WPMTX2005	Integrative work 1	3	q1
Block 2			
WPMTX2006	Modelling	8	q1
WPMTX2007	Simulation	4	q1
WPMTX2008	Integrative work 2	3	q1
Block 3			
WPMTX2009	Essentials of Physiologically Based Pharmacokinetic (PBPK) Modelling and simulation	7	q2
WPMTX2010	Integrative work 3	5	q2
XXXX	Elective course	3	q2
Block 4			
WPMTX2011	Master thesis	15	q2

To develop the program, we focused on the two figures below that show the process of Pharmacometrics and all the aspects that need to be included in the program (Figures 1 and 2).

Figure 1: Learning versus confirming in clinical drug development.

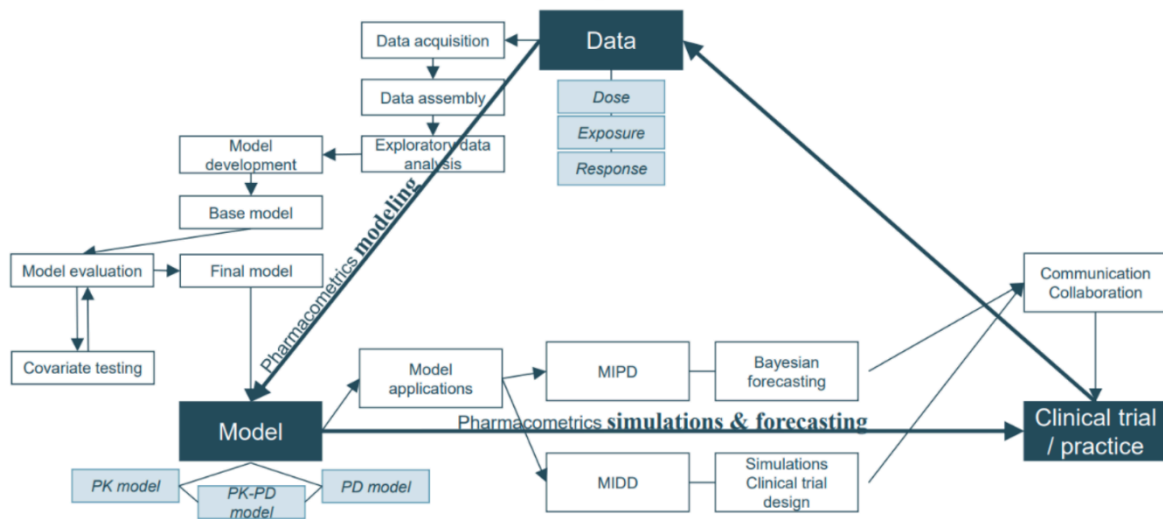


Figure 2 : Workflow of constructing a pharmacometrics model

PMTX2MC - Teaching profile

Learning outcomes

On successful completion of this programme, each student is able to :

- 1 - Mobilize and Use Statistical/Mathematical Language for Data Modeling to answer pharmacological questions.
 - 1.a. Use and apply statistical/mathematical language underlying the modeling of complex datasets to answer a pharmacological question.
 - 1.b. Build and manipulate statistical databases necessary for pharmacometrics.
 - 1.c. Use statistical software and coding specifications to translate a pharmacological question into a statistical problem.
 - 1.d. Interpret statistical results to address a pharmacological question.
- 2 Master and Apply methods and software Tools Used in Pharmacometrics to Concrete Problems.
 - 2.a. Construct a database in a format suited to the modeling software used.
 - 2.b. Understand and master the concept of models and modeling.
 - 2.c. Generate a model from a dataset using modeling software.
 - 2.d. Interpret model diagnostic parameters to select an appropriate model for the data.
 - 2.e. Identify and test potential covariates to integrate into the model and evaluate their statistical, pharmacological, and clinical relevance.
 - 2.f. Validate the model and the obtained results.
- 3 Utilize and Exploit Developed Models to Solve Real-World Problems While Ensuring Result Quality.
 - 3.a. Integrate a research question and align it with developed tools.
 - 3.b. Master simulation software.
 - 3.c. Understand pharmacokinetic-pharmacodynamic (PK-PD) relationships.
 - 3.d. Master the theory related to clinical trials.
 - 3.e. Interpret simulation results and integrate them to optimize the design of a clinical trial.
- 4 Solve Concrete Pharmacological Problems Using Acquired Knowledge and a Rigorous Scientific Approach.
 - 4.a. Conduct a comprehensive review of a concrete problem (extensive bibliographic analysis of an active pharmaceutical ingredient).
 - 4.b. Identify the problem, formulate hypotheses, and choose an appropriate methodology.
 - 4.c. Generate precise and accurate results that answer the research question.
 - 4.d. Critically analyze and interpret the obtained results.
 - 4.e. Identify the limitations of the adopted approach.
 - 4.f. Communicate results effectively and rigorously while adhering to professional standards.
- 5 Develop and Execute a Quantitative Pharmacology Research Project in a Professional Setting.
 - 5.a. Collaborate in a team and across disciplines in the various phases of drug development.
 - 5.b. Acquire an appropriate level of autonomy.
 - 5.c. Communicate and simplify aspects related to specific acquired competencies.
 - 5.d. Set objectives and implement strategies to achieve them.
 - 5.e. Guide therapeutic choices to optimize and personalize drug use.
 - 5.f. Translates results of pharmacometrics modelling and simulations correctly into actionable insights, recommendations and decisions that can be used in drug discovery, development, regulatory and clinical care.
 - 5.g. Demonstrate the scientific curiosity and competences to independently continue to study developments in the field of pharmacometrics.

Programme structure

The programme (60 credits - 57 compulsory course credits - including the Master's dissertation and 3 elective course credits) consists of 4 blocks of 15 credits, including 3 more theoretical blocks, and a Master's dissertation block. Each theoretical block also includes an integrative work, during which students work in groups on a specific pharmacological problem. The Master's dissertation consists of a specific research project in a research environment (industry, university research group, hospital, etc.) where students explore their subject individually. All the topics for the Master's thesis are already presented in the first teaching unit, which allows students to make an early choice and to follow the theoretical learning with the subject of their Master's thesis in mind.

PMTX2MC Programme

Detailed programme by subject

CORE COURSES

- Mandatory
- ⊗ Optional
- △ Not offered in 2026-2027
- ⊖ Not offered in 2026-2027 but offered the following year
- ⊕ Offered in 2026-2027 but not the following year
- △ ⊕ Not offered in 2026-2027 or the following year
- Activity with requisites
- ⊕ Open to incoming exchange students
- ⊗ Not open to incoming exchange students
- [FR] Teaching language (FR, EN, ES, NL, DE, ...)

Click on the course title to see detailed informations (objectives, methods, evaluation...)

○ Mandatory courses

○ WPMTX2001	Drug life cycle	Olivia Dalleur (coord.)	EN [q1] [22.5h] [3 Credits] ⊗
○ WPMTX2004	Data management in pharmacometrics	Laure Bindels (coord.) Laura Symul	EN [q1] [22.5h+15h] [4 Credits] ⊗
○ WPMTX2005	Integrative work 1	Laure Elens (coord.) Emmanuel Hermans	EN [q1] [0h+15h] [3 Credits] ⊗
○ WPMTX2006	Modeling <i>This course is taught on the Gasthuisberg Campus in Leuven.</i>	Laure Elens (coord.)	EN [q1] [38h+19h] [8 Credits] ⊗
○ WPMTX2007	Simulation <i>This course is taught on the Gasthuisberg Campus in Leuven.</i>	Laure Elens (coord.)	EN [q1] [19h+10h] [4 Credits] ⊗
○ WPMTX2008	Integrative work 2	Laure Elens (coord.)	EN [q1] [0h+22.5h] [3 Credits] ⊗
○ WPMTX2009	Physiologically-based pharmacokinetics modeling and simulation <i>This course is taught on the Gasthuisberg Campus in Leuven.</i>		EN [q2] [33h+33h] [7 Credits] ⊗
○ WPMTX2010	Integrative work 3	Olivia Dalleur (coord.)	EN [q2] [0h+22.5h] [5 Credits] ⊗
○ WPMTX2011	Master thesis		EN [q2] [] [15 Credits] ⊗

○ Compulsory elective courses

The student chooses one of the following two courses based on their previous experience and their project.

⊗ WPMTX2002	Concepts of multilevel, longitudinal, and mixed models <i>This course is taught on the Gasthuisberg Campus in Leuven.</i>		EN [q1+q2] [35h] [5 Credits] ⊗
⊗ WPMTX2003	Basic concepts of pharmacokinetics and pharmacodynamics	Laure Elens (coord.) Emmanuel Hermans	EN [q1] [30h] [5 Credits] ⊗

○ Elective courses

The student chooses 3 credits from the UCLouvain or KULeuven program.

The programme's courses and learning outcomes

For each UCLouvain training programme, a [reference framework of learning outcomes](#) specifies the the skills expected of every graduate on completion of the programme. Course unit descriptions specify targeted learning outcomes, as well as the unit's contribution to reference framework of learning outcomes.

PMTX2MC - Information

Access Requirements

In the event of the divergence between the different linguistic versions of the present conditions, the French version shall prevail.

Decree of 7 November 2013 defining the landscape of higher education and the academic organization of studies.

The admission requirements must be met prior to enrolment in the University.

Unless explicitly mentioned, the bachelor's, master's and licentiate degrees listed on this page are to be understood as those issued by an institution of the French, Flemish or German-speaking Community, or by the Royal Military Academy.

In the event of the divergence between the different linguistic versions of the present conditions, the French version shall prevail.

SUMMARY

- [General access requirements](#)
- [Specific access requirements](#)

General access requirements

Translated from https://www.galilex.cfwb.be/fr/leg_res_01.php?ncda=39681&referant=l02

Art. 112. of the "Décret définissant le paysage de l'enseignement supérieur et l'organisation académique des études" :

§ 1. In accordance with the general requirements established by the academic authorities, students who have:

1. a master's degree;
2. an academic degree similar to the one mentioned in the preceding paragraph awarded by a higher education institution in the Flemish Community or the German-speaking Community, or by the Royal Military Academy, by virtue of a decision of the academic authorities and in accordance with any additional requirements they may establish;
3. a foreign academic degree deemed equivalent to the one mentioned in paragraph 1, in accordance with this Decree, a European directive, an international convention or other legislation, in accordance with the same requirements.

The additional admission requirements referred to in paragraph 2 are intended to ensure that the student has acquired the knowledge and skills required for the studies in question. When the additional admission requirements consist of one or more additional course units, these may not represent more than 60 additional credits for the student, taking into account all the credits that he or she may otherwise use for admission. These course units are part of the student's study programme.

§ 2. In accordance with the general requirements established by the academic authorities, a student who holds a title, diploma, degree or certificate of higher education, in the French Community or outside it, which does not grant him or her eligibility for admission to a specialised master's course by virtue of the preceding paragraph, may nevertheless be admitted by the jury of the course in question, in accordance with the additional requirements that it establishes, if the totality of the higher education that he or she has completed or the expertise that he or she has acquired is valued by the jury to be at least 240 credits.

§ 3. By way of derogation from these general requirements, the academic authorities may also admit to a specialised master's course holders of a title, diploma, degree or certificate awarded outside the French Community which, in that system of origin, grants direct eligibility for postgraduate studies, even if the studies sanctioned by these credentials are not organised into distinct degree courses or within a time period of at least five years.

Specific access requirements

Admission through evaluation by an admissions committee:

Subject to the evaluation of dossiers by the admissions committee, this Advanced Master's program is open

- to holders of a master's degree in Pharmacy, Biomedical Sciences, Medicine or Veterinary Medicine
- to holders of a master's degree in (bio-)Engineering, Biology, Chemistry, Statistics, Epidemiology, Mathematics, Physics or any other related discipline.

Admission based on dossier means that based on the submitted dossier and the content of the candidate's prior education, admission may be direct, or after a preparatory program for up to 60 credits (ECTS), or may be refused.

Eligibility criteria for applications

The submission of the explanatory dossier must be introduced to UCLouvain. In addition to submitting an online registration request to the UCLouvain registration service (www.uclouvain.be/inscription), any application for registration must also be submitted to the secretariat of the Faculty of Pharmacy and Biomedical Sciences (guillaume.arnould@uclouvain.be) with a complete dossier **no later than May 15** of the year preceding the requested academic year for registration. The eligibility of the applications and the acceptance of registrations will be reviewed by the committee. Candidates will be informed of the decisions during the month of July.

This dossier must include a detailed academic curriculum (previous degrees, grade list, ranking, scans of transcripts, etc.), a motivation letter, and, if available, proof of proficiency in English (TOEFL iBT, IELTS, Cambridge certificate...). If the candidate is unable to provide such a proof of English proficiency, the dossier must at least include a self-evaluation of English skills (listening, speaking and writing) according to the self-assessment grid of the common European framework of reference for languages (CEFR). If necessary, the admissions committee may request to hear candidates during a selection interview (see below). Other relevant documents might be spontaneously added in the dossier if deemed necessary by the candidate (e.g. letter of support, proof of professional experience...).

As for **applicants from outside Belgium**, comparability of the diploma is not always easily established, applicants will be asked to upload additional documents with their application:

- For applicants from universities that have an exchange agreement with the KULeuven or UCLouvain for the relevant discipline (i.e. pharmacy, medicine, biomedical sciences), or universities that are in the global top 200 in the most recent Times Higher Education or QS rankings:
 - Scans of transcripts and diplomas
- For applicants from other universities as it is impossible to reliably assess the comparability.
 - Scans of transcripts and diplomas.
 - A complete list of course titles for which credits have been obtained should be part of this. The course size (in ECTS-credits) and the result obtained should be indicated, preferably according to the ECTS-scale; if a different scale is used, a summary explanation on the meaning of the scores should be provided.
 - For the courses that are deemed by the applicant most relevant as a preparation for the master of Pharmacometrics, a short (about one half to one page) description according to the standard guidelines for an ECTS-study guide should be provided as well.

Only complete applications will be examined by the jury. The jury decides whether candidates are eligible on the basis of the information contained in their application dossier as a whole. The decision is based on the following factors:

- Academic Level of the Candidate

Given the wide diversity of backgrounds and originating institutions, there is no strict universal rule. However, candidates are typically rejected if their study paths in the first or second cycles are significantly longer than the norm. Similarly, profiles with notable deficiencies in fundamental subjects or consistently low overall averages are less likely to be considered. Applicants who can demonstrate prior experience in pharmacometrics in a broad sense or who can clearly articulate how this training will impact their future career in connection with pharmacometrics are more likely to be accepted.

- Language requirement

Candidates must demonstrate a sufficient level of English proficiency. If necessary, this will be assessed during a selection interview conducted in English by the admission committee.

As a comparison, the expected levels correspond to :

- TOEFL iBT: minimum overall score of 94, with minimum subscores of 19 for Reading, 18 for Listening, 19 for Speaking and 21 for Writing
- IELTS Academic test: minimum overall score of 7.0, with minimum subscores of 6.5 for Reading, 6.0 for Listening, 6.0 for Speaking and 6.0 for Writing
- Advanced or Proficiency Cambridge Certificates: minimum score of 185, with at least 176 for reading and 169 for listening, speaking and writing.

If relevant, other criteria can be considered by the admission committee (e.g. previous university degree obtained in a country where English is the only official language (Australia, English-speaking Canada, Ireland, New Zealand, the United Kingdom and the United States of America) and if the study program was taught exclusively in English) and can thus be documented in the application dossier.

- Selection interview

A selection interview may be organized to make sure that the applicant properly masters the basic concepts needed for the study program. The interview also serves for checking the applicant's proper command of English. Applicants should be aware that rejection after interview is a possible outcome. The decision to organize such a selection interview solely rests on the study program admission jury. When the selection interview is organized, the applicant will be contacted at the e-mail address mentioned in the application form. Failure to answer this e-mail within 14 days will result in the rejection of the admission request.

Teaching method

The Advanced Master of Pharmacometrics program emphasizes a pedagogy that promotes autonomy and self-empowerment, fostering the transversal transfer of competencies among students. This is achieved through problem-based learning situations and integrative group work, where students from diverse backgrounds collaborate to solve complex problems. This collaborative approach ensures that students learn from each other's unique perspectives and expertise. Additionally, the master thesis serves as a capstone project, ensuring that all competencies and outcomes are individually acquired and applicable to real-life problems, preparing graduates for practical challenges in their future careers.

Evaluation

The evaluation methods comply with the [Academic regulations and procedures](#). More detailed explanation of the modalities specific to each learning unit are available on their description sheets under the heading "Learning outcomes evaluation method".

Throughout the course, a variety of assessment formats are introduced, ranging from traditional written and oral exams, open and closed book, assignments, presentations, tasks, but also online exams (e.g. XToledo or Ans). On the one hand, this enables a wide range of learning outcomes to be assessed, both in terms of knowledge and understanding, but also communication skills and research skills. On the other hand, it allows all students to experience a range of assessment formats, without favouring any particular assessment format that might be better or less well suited to the personality of individual students.

To obtain the average, the marks obtained for the teaching units are weighted by their respective credits.

Mobility and/or Internationalisation outlook

If requested by the student, the internship related to the thesis might be completed at a foreign organization, industry, hospital, or university laboratory. In this particular case, the choice of the internship supervisor and location must be pre-approved by the academic program coordinators. The student can also seek assistance from the academic staff's networks if they wish to undertake their internship abroad but do not have a contact with a potential partner. In all cases, an internship agreement must be established with the foreign partner.

Possible trainings at the end of the programme

This advanced Master's degree does not lead to any other training.

Contacts

Curriculum Management

Academic supervisor: [Laure Elens](#)

Other academic Supervisor(s)

- erwin.dreesen@kuleuven.be

Jury

- Jury president: [Laure Elens](#)
- Jury secretary: erwin.dreesen@kuleuven.be

Useful Contact(s)

- Contact person: secretariat-farm@uclouvain.be

