



Novel challenges in Toxicology

PhD Advanced Course

19-22 October, 2021

The course will be held at FFUL in a hybrid-mode, with both in-person and virtual lectures (zoom platform). For the attendees who choose to be evaluated, the presential attendance is highly encouraged, if the circumstances allow.

ECTS: 6; Classes: 22.5 hours

Course Coordinators: Joana Miranda and Nuno Oliveira

Teaching Staff: The teaching staff is composed by lecturers with expertise in the field of each seminar. As such it includes professionals from academia and regulatory sciences, including internal teaching staff from FFUL, and invited external experts.

Participants: This course targets all PhD students from FFUL, external PhD students and academic and scientific community members.

Short introduction:

Novel challenges in Toxicology is an innovative PhD Advanced course that provides an updated overview of key toxicological concepts and milestones, and also simultaneously addresses the new challenges and opportunities of modern Toxicology. The course will be held at FFUL in the framework of the research areas of the Research Institute for Medicines – iMed. This course is offered to the students enrolled in the PhD programme in Pharmacy (FFUL) that need to complement their background in different aspects of the Toxicological Sciences and/or need to use toxicological tools to complete their PhD work plan. Due to the large interdisciplinary and translational nature of the Toxicology field it is expected that this course would be appealing to a high number of PhD students, master students as well as young researchers.

Goals and Learning Outcomes:

Toxicological concepts are of utmost importance for all steps involved in drug discovery & development. Moreover, the new challenges associated with Toxicology are determinant for many other aspects of the biomedical sciences. By the end of this course, it is expected that

the students integrate the acquired knowledge towards complex toxicological phenomena and understand the impact of Toxicology in our modern society.

It is also expected that the students understand the adverse effects associated with the exposure of toxic xenobiotics from different classes and modes of action (MoA) as well as the inter-individual variations in biotransformation enzymes and membrane transporters, including the importance of genetic polymorphisms. Particular attention will be devoted to genotoxicity issues and their impact in carcinogenesis and in drug development. Safety issues in novel medicines, including biologicals, will also be highlighted.

Moreover, the application and translation of advanced *in vitro* models (*e.g.* 3D cellular models) in the drug development process in the research and industry will be a key topic of the advanced course. Finally, the students should also understand the role of the *Omic*s and potential of stem cell technology in predictive toxicology towards personalization.

Registration and Fees

The [registration](#) is made through the **FenixEdu Platform** until October 12, 2021.

- Registration with evaluation: 125€
- Registration without evaluation: 100€

This course is free for 1st year PhD students of FFUL Doctoral Program.

PROGRAMME

(Please note that this programme is preliminary and may be subjected to time changes, which however will be communicated)

The course is divided into three major topics addressing a balanced combination of lectures on theoretical and practical case-based discussions presented during a dedicated course with limited attendance. The training programme has specific slots allocated to seminars and workshops, including informal discussions with lecturers (tutorial teaching). At the end of the course, the students are expected to orally present a group assignment consisting of a proposal for a Research Project.

TUESDAY – 19 October

9h30-10h | **Opening Session**

Nuno Oliveira and Joana Miranda

Module 1: Toxicology concepts and challenges

1. Overview of key concepts, applications, and challenges of toxicology

10h-11h| Nuno Oliveira, FFUL, PT

11h-11h30| **Break**

2. Mechanisms of target and non-target organ toxicology

11h30-12h30| Drug induced liver injury: where do we stand?

Isabel Lucena, Univ. Malaga, ES

12h30-13h30| Mechanisms of chemical-induced genotoxicity

Bojana Zegura, NIB, SL (to be confirmed)

13h30-15h| **Lunch break**

3. Applied toxicology in pharmaceutical sciences

15h-16h| Redox toxicology

Ana S Fernandes, Univ. Lusófona, PT

16h-17h| Food and environmental toxicology: from xenobiotics exposure to cancer.

António Sebastião Rodrigues, NMS, PT

WEDNESDAY – 20 October

Module 2: Emerging technologies in toxicology

1. Advanced models in toxicology

9-10h| 3D liver models in *in vitro* toxicology

Joana Miranda, FFUL, PT

10-11h| Zebra fish models in toxicology

Ozlen Konu, Bilkent University, TK

11-11h30| **Break**

2. Stem cell toxicology

11h30-12h30| Generation of functional human hepatic endoderm from human induced pluripotent stem cells for toxicological applications

Gareth Sullivan, UiO, NO

12h30-13h30| Organs-on-a-Chip (OoC) in toxicology

Madalena Cipriano, Faculty of Medicine, University Tübingen, DE

13h30-14h30| Lunch break

3. Systems toxicology: the “omics” era

14h30-15h30| Systems toxicology

Juan M. Falcon-Perez, CIBERehd, ES

15h30-16h30| Proteomics for biomarkers identification in toxicology

Vukosava Milic Torres, FCUL, PT

4. Personalized and predictive toxicology

16h30-17h30| *Christopher Goldring, University of Liverpool, UK*

THURSDAY – 21 October

Module 3: Impact of Toxicology in the new era

1. Safety issues in novel medicines

9-10h| Regulatory toxicology

Beatriz Silva Lima, FFUL, PT

10-11h| Toxicological issues in advanced therapies

Isabel Vieira, Infarmed, PT

11-12h| 3R's policy in drug development
Sonja Beken, FAMHP, BE

12h-13h30| **Lunch break**

2. Milestones of toxicology and contemporary issues

13h30-14h30| New insights on the bioavailability of xenobiotics
Fernando Remião, FFUP, PT

14h30-15h30h| Occupational exposure and human biomonitoring
João P Teixeira, INSA, PT

3. Impact of toxicology in modern society

15h30-16h30| *Félix Carvalho, SPF & EUROTOX & FFUP, Portugal*

16h30-17h| Guidelines for learning assessment
Nuno Oliveira and Joana Miranda

FRIDAY – 22 October

9-13h| Autonomous work

13-14h| **Lunch break**

14h-17h| *Student Oral Presentations of the Research Project Assignments*

17h-17h30| **Closing Session**
Joana Miranda and Nuno Oliveira

ASSESSMENT: *Student Oral Presentations and Written Document of the Research Project Assignments*

Although the course is open, assessment of the course is valid only for students registered in the PhD programme in Pharmacy from FFUL and for participants who chose the “Registration with evaluation” modality. It consists in the preparation and submission of a research project (8 pages limit) in a topic relevant within the framework of the course. Students are to be grouped in interdisciplinary groups of 2 or 3 students.

The research project should be structured to address an innovative research question as follows: *i)* Title; *ii)* The problem and the innovative approach; *iii)* Plan and methodology; *iv)* Expected results and impact.

The project will be evaluated according to the following criteria and weighting: a) Novelty and relevance (20%); b) Clarity and credibility of the approach to the theme/problem (20%); c) Multidisciplinary aspects of the research plan (30%). Peer (15%) and self-assessment (15%) will also be considered.