PLANNER
MEFARM 2025 – 2026
Ciências e Tecnologias do Fabrico 2 / Manufacturing Sciences and Technologies 2

Course Duration: 13 weeks
Classes: Feb 20th 2026 to May 29th 2026

Evaluation:

Classes Attendance	10%	
Classes Contribution	20%	
Subject Presentation (1)	20%	
Final Project (2)	50%	
Protocol Discussion		10%
Project Execution		10%
Project Quality		10%
Project Presentation		20%

(1) Subject presentation
Groups present at the beginning of the theoretical classes an assigned topic. The idea is to provide an overview of the topic highlighting the most important aspects to understand it, practical applications, actual challenges (30 min maximum time). The format should be decided by the groups. If videos are to be visualized, they should be edited in order not to surpass 2 min each and should be commented during the visualization. All members of the group should provide a contribution, ideally evenly distributed. The idea is to provide a kick-off for the remaining theoretical class that'll cover the same topic. The topics are disclosed in the classes calendar below.

(2) Final project
A project involving a laboratory component is provided to groups in the first class of the semester. Groups will develop the project along the semester, essentially covering four main components: 1) idealization of the experimental protocol to execute in the pharmaceutical technology lab; 2) Laboratory execution; 3) Data analysis, results interpretation; 4) project presentation in the end of the semester. Groups will receive a title and a brief description of the objective of the project. Additionally, students will visit the lab in the first PL class where available equipment, laboratory material, and raw-materials will be presented to support the design of the experimental protocol. Three weeks will be assigned for groups to execute the required experiments. Collected data, will be processed in the remaining weeks. The last semester week will be dedicated to the projects' presentations. The themes for this edition are disclosed below and will be assigned to the groups in the first class. Before the project presentation groups send by email the project results written in the form of a scientific article (use the European Journal of Pharmaceutical Sciences format as reference) with a maximum of 10 pages (4 figures and 3 tables maximum).

Final Project Themes:
1 Development of an infrared-based analytical method for the determination of content uniformity in caffeine-containing tablets.
2 Development of a near-infrared–based assay method for the determination of paracetamol applied to a flowing powder.
3 Impact of the amount of acorn flour on the dissolution profile of paracetamol tablets obtained by direct compression.
4 Development of a multivariate analytical method for the determination of caffeine concentration in powder blends by UV–Vis spectroscopy.
5 Optimization of a blending process of a powder paracetamol-containing formulation.
6 Assessment of the impact of acorn flour content on the mass uniformity test of hard capsules.
7 Evaluation of the impact of the amount of acorn flour on the particle size distribution of granules produced by low-shear wet granulation.
8 Assessment of the impact of acorn flour content on the dissolution profile of extended-release paracetamol tablets.

Classes Planification

Week 1

#T-1 Feb 20, 11:30-13:30

Course outline. Goals, organization, study, evaluation. Course motivation: concepts and definitions. Groups definition (4 elements)**.** Final projects assignment.

#PL-1 Feb 20, 14:30:17:00

Laboratory tour. Development of the final project experimental protocol.

Week 2

#T-2 Feb 27, 11:30-13:30

Overview of manufacturing sciences: manufacturing of APIs and medicines.

#PL-2 Feb 27, 14:30:17:00

EVAL Discussion of final project laboratory protocols.

Week 3

#T-3 Mar 6, 11:30-13:30

EVAL Group 1 Concept of Process Analytics/Process Analytical Technology. In-situ real time controls in pharmaceutical manufacturing processes.

#PL-3 Mar 6, 14:30-17:00

Handling large volumes of experimental/spectroscopic data.

Week 4

#T-4 Mar 13, 11:30-13:30

EVAL Group 2 Experimental design applied to the development and manufacturing of pharmaceutical drug products (QbD): pharmaceutical development and manufacturing process optimization

#PL-4 Mar 13, 14:30-17:00

Experimental design to optimize the formulation and manufacturing process of an extended-release drug product (tablet).

Week 5

#T-5 Mar 20, 11:30-13:30

EVAL Group 3 Near-infrared and infrared spectroscopy: concept and importance for monitoring and control of pharmaceutical processes and products.

#PL-5 Mar 20, 14:30-17:00

Working on practical examples of near-infrared/infrared spectroscopy applications.

Week 6

#T-6 Mar 27, 11:30-13:30

EVAL Group 4 Terahertz: concept and potential applications for the pharmaceutical industry.

#PL-6 Mar 27, 14:30-17:00

Working on practical examples of Terahertz spectroscopy applications.

Week 7

#T-7 Apr 10, 11:30-13:30

EVAL Group 5 Spectroscopy data mathematical pre-processing and modelling methods applied in manufacturing and quality control of pharmaceuticals.

#PL-7 Apr 10, 14:30-17:00

Final project assignment: Laboratory Session #1.

Week 8

#T-8 Apr 17, 11:30-13:30

EVAL Group 6 Continuous manufacturing of drug products: technological advantages and challenges.

#PL-8 Apr 17, 14:30-17:00

Final project assignment: Laboratory Session #2.

Week 9

#T-9 Apr 24, 11:30-13:30

EVAL Group 7 Real-time release testing in the context of manufacturing of drug products: concept and examples of potential implementations.

#PL-9 Apr 24, 14:30-17:00

Final project assignment: Laboratory Session #3.

Week 10

#T-10 May 8, 11:30-13:30

EVAL Group 8 Industry 4.0: connectivity and digitalization. Pharmaceutical industry adoption roadmap.

#PL-10 May 8 24, 14:30-17:00

Final project assignment: working on final project data.

Week 11

#T-11 May 15, 10:30-12:30

Quality control of drug products.

#PL-11 May 15, 13:30:16:00

Working on the development and validation of a spectroscopy based analytical method for uniformity dosage assessment of a pharmaceutical product.

Week 12

#T-12 May 22, 10:30-12:30

GMPs and the regulatory framework of medicines manufacturing.

#PL-12 May 22, 13:30:16:00

Final project assignment: working on final project data.

Week 13

#T 13 May 29, 11:30-17:00

EVAL Final project presentations.

Contacts:

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