

# MASTER OF PRODUCT DEVELOPMENT (MPD)

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## **MPD 510. Food and Beverage Product Development and Launch I. (3 Credits)**

This course introduces students to the development process of a new food product in the marketplace. The focus of the course centers on an integrated, phased approach to product development in the food and beverage industry with focus on the retail grocery channel. Disciplines such as consumer insights, legal and regulatory, idea generation, concept definition and related business practices are explored in development of a new food product from concept to marketplace with the goal of delivering value to consumers and customers.

## **MPD 515. Food and Beverage Product Development and Launch II. (3 Credits)**

This course is a continuation of Food and Beverage Product Development and Launch I. It introduces students to the development process of a new food product in the marketplace. The focus of the course centers on an integrated, phased approach to product development in the food and beverage industry with focus on the retail grocery channel. Disciplines such as consumer insights, concept testing, concept refinement and definition, commercialization, marketing and business practices are explored in development of a new food product from concept to marketplace with the goal of delivering value to consumers and customers.

## **MPD 516. Strategic Package Design. (3 Credits)**

This course is an in-depth study of the planning and execution of consumer product packaging strategy. Exploration of how structural and graphic communication align with business goals and brand strategies. Emphasis on development of strategic framework. This is not a graphic design course.

## **MPD 517. Sales and Category Management. (3 Credits)**

This course is a study of retail category management principles and process. Understanding of merchandising strategies applied by retailers to optimize consumer shopping and drive sales within various categories. Explore different distribution channels (grocery, club, mass merchandisers, convenience, etc.) and their differences. Understand and apply sales management strategies when introducing new products to market.

## **MPD 518. Consumer Insights. (3 Credits)**

This course is a study of the many consumer research options available through product and advertising development. Pre and Post testing and validation research methodologies will be explored in detail. Insights uncovered in each phase will be discussed and benefits of research methodology understood.

Prerequisites: MPD 510 and 515.

## **MPD 530. Global Production Operations. (3 Credits)**

## **MPD 534. Principles of Drug Design and Development. (3 Credits)**

This course introduces students to the rationale behind the development of pharmaceutical agents, cosmetics and fragrances, and food and beverage additives. Students will be tasked with designing a novel therapeutic or consumer product using computer-aided rational design strategies, and also perform fermentation-based production and drug screening.

## **MPD 540. Research Design, Methods, and Ethics. (2 Credits)**

The course will introduce graduate students to the processes involved in research design. This class will introduce the approach to generating a research question, conducting scientific inquiry (i.e. Literature Review), choosing a research design methodology that adequately addresses the research question, data collection and management methods, sound approaches to optimize the reproducibility of research and reporting relevant to basic pharmaceutical sciences, social/behavioral, and health services research. We will also discuss the purpose of review bodies such as IRB and IACUC. Lastly, we will discuss guiding principles of conducting ethical research. At the end of the course, each student should develop a research proposal that must be approved by a faculty mentor and evaluated by the course coordinators.

## **MPD 543. Industry Leader Seminar Series. (1 Credit)**

This course introduces the graduate student to best practices in the pharmaceutical and chemical product development field, from the perspective of leaders in those industries, who give guest lectures for the students. Students get exposed to the culture, business and technical aspects of the industry, and hone their professional networking skills.

## **MPD 593. Analytical Characterization of Drugs and Other Chemicals. (3 Credits)**

This course provides brief lectures on the purification and spectral characterization of pharmacologically important molecules. The majority of the class is not taught in the classroom, but consists of lab work to be done using analytical instrumentation – especially NMR, but also Raman, IR, MS and HPLC. Weekly lab exercises are to be performed, and at the end of the semester the students provide a report that summarizes their experiments and results. Students will pursue a hands-on project, such as a drug stability study, characterizing drug impurities during manufacturing, API or precursor integrity in various steps in the pharmaceutical supply chain, or natural products.

## **MPD 595. Pharmaceutical Manufacturing and Process Chemistry. (3 Credits)**

This course introduces the graduate student to organic synthesis as related to chemical process development. The focus of the course centers on the step-by-step approach to process research and development used by chemists to make active pharmaceutical ingredients (APIs).

## **MPD 596. Advanced Pharmaceutical and Process Chemistry. (3 Credits)**

This course introduces the graduate student to organic synthesis as related to chemical process development. The focus of the course centers on the step-by-step approach to process research and development used by chemists to make active pharmaceutical ingredients (APIs). A selected two-step reaction sequence will be evaluated for scale-up potential using the concepts learned from MPD 595. After performing a small scale evaluation and process development changes, a larger Good Laboratory Practices (GLP) scale-up will be performed on 5-Liter scale.

**MPD 597. Product Development Project. (1-2 Credits)**

This course introduces the graduate student to Research and Development projects, analogous to the types of projects they might encounter in the pharmaceutical or chemical industries (e.g. reaction scale-up; drug purification; dissolution study; optimize formulation; address polymorph issue; improve cost-efficiency of a manufacturing process; new product design). This is essentially graduate research, where a project is co-mentored by a CUW faculty member and, ideally, a scientist from industry. This course is taken every semester that the student is in the MPD program (Fall, Spring) beginning in their second semester, and culminates in the defense of a Master's thesis, focused in the area of product development and commercialization. Students may also choose their own product development project, or one that is currently being pursued by an MPD faculty researcher and/or industry affiliate. Students will choose their project topic in the first semester of the MPD program as part of the PHAR/MPD 533 class, after discussions with at least 3 MPD faculty researchers, and will perform research in the ICDD (Innovation Center for Drug Development; ICDD) and Pharmaceutical Sciences (Mequon Campus) laboratories.

**MPD 598. Introduction to cGMP and Methods of Quality Control in Manufacturing . (3 Credits)**

This course introduces students to the biopharmaceutical rationale behind the development of Active Product Ingredients (API) into various drug formulations. Students will be tasked with developing Standard Operating Procedures (SOP), following Good Laboratory and Manufacturing Practices (GxP), while being introduced to the how the target (or bioassay/test) organism will respond to the various formulations. The course is intended for both pharmaceutical and chemistry tract MPD graduate students who do not have PharmD backgrounds. It is designed to lead those students into the MPD 599 Formulation class in the subsequent spring semester. By introducing 'hands on' techniques for GxP in the cGMP synthesis and USP 797 compounding facilities at the Concordia Innovation Center for Drug Development (CICDD), the students are better trained for the pharmaceutical industry production and management positions.

**MPD 599. Formulation & Delivery Forms. (3 Credits)**

This course introduces the graduate student to the scientific and engineering principles utilized in producing a commercial pharmaceutical drug product from drug substance(s) and excipients, along with a survey of modern pharmaceutical dosage forms, which, in combination, forms the basis for delivering optimal therapeutic results for the patients. While emphasis will be placed on the unit operations for preparing and characterizing the ubiquitous compressed tablet dosage form, students will get a broad overview of frequently used dosage forms and drug delivery systems. In a laboratory setting students will perform these processing unit operations and then characterize their formulated products.