UNIVERSITY of BRADFORD

Module Descriptor

Module Details	
Module Title	Fundamentals of Formulation Development and Manufacturing Technology
Module Code	PHA5016-D
Academic Year	2024/5
Credits	40
School	Life Sciences (Faculty-wide)
FHEQ Level	FHEQ Level 5

Contact Hours	
Type	Hours
Directed Study	320
Seminars	4
Lectures	32
Tutorials	6

Availability	
Occurrence	Location / Period
BDA	University of Bradford / Academic Year

Module Aims

To introduce students to the established principles of pharmaceutical and cosmetic formulation and processing, and their application in the preparation of final products. By the end of this module students will be able to critically appraise solid, semi-solid and liquid (aqueous and non-aqueous) formulations and emerging formulation technologies for optimising dosage forms.

Outline Syllabus
Introduction to formulation science: concepts, principles, objectives, range of dosage forms (solids, semi-solids, aqueous and non-aqueous liquids, suspensions, emulsions) and relationship to therapeutic/cosmeceutical performance. Physico-chemical stability of formulations including drug-excipient interactions. Colloid interface science and its application to the formulation of multiphase pharmaceutical and cosmetic products. Concepts in skin science within skin, hair and nail biology. The positive and negative biological impacts of cosmetic products on human physiology. Small molecule drugs such as oral solid dosage forms, transdermal, emulsion, suspension and parenteral. Large molecule drugs such as monoclonal antibodies, biosimilars, antibody-drug conjugates and gene therapies. Biophysical properties of biopharmaceuticals and non-clinical and clinical testing of biopharmaceuticals. Principles of pharmacokinetics (drug absorption, distribution, metabolism and excretion). Cosmetics will include formulation of different types of skin care, hair care, makeup, fragrances and personal care products, including skin and hair substrate attribute measurements, product form and various visual and consumer methods. Ethics for in-vitro versus in-vivo testing and requirements for animal replacement models. Cosmetic claim substantiation. Applications of artificial intelligence in pharmaceuticals and cosmetics.

Learning Outcomes	
Outcome Number	Description
01	Critically evaluate the type of solid, semisolid and liquid product forms and the physico-chemical principles of their design and formulation.
02	Critically appraise how pharmaceutical and cosmetic materials are formulated into dosage forms.
03	Understand and critically appraise established concepts of physicochemical characterisations of active ingredients and excipients in the development of pharmaceutical/cosmetic products and their testing.
04	Analyse the forces operating at liquid-solid surfaces and understand how these may be modified when considering the wetting of pharmaceutical powders, the spreading and adhesion of liquids to solid surfaces and detergency.
05	Critically evaluate the relationship between surface/interfacial forces and the formulation of liquid-liquid multiphase dosage forms.
06	Critically appreciate the significance of particle-particle interactions, in aqueous media, when formulating suspensions.
07	Evaluate the phenomenon of micelle formation by surface active molecules and understand the significance of this process in the formulation of solubilised systems.
08	Understand and be able to express an opinion on relevant issues to pharmaceutical/cosmetic science, such as sustainability, natural ingredients, and the circular economy.
09	Effectively communicate information to audiences with structured and coherent arguments.
10	Critically evaluate experimental design and data, apply underlying concepts, and effectively communicate interpretations.
11	Evaluate applications of artificial intelligence for pharmaceuticals and cosmetic science.

Learning, Teaching and Assessment Strategy

Lectures will deliver core content and provide students with the opportunity to understand and critically appraise the established concepts of solid, semisolid, suspensions, emulsions, aqueous and non-aqueous liquid dosage forms. Lectures will be complemented by workshops, group discussions and tutorials to allow you to apply this knowledge to specific topic areas and problems. Students will gain exposure to real-life industrial case studies and the manufacturing environment via application exercises and ?Company to Classroom? sessions. The case studies of pharmaceutical product development will be provided by seminars.

Laboratory sessions will teach formulation principles and provide students with handson experience in making pharma and cosmetics (skin and hair care) products and testing their stability.
Directed study will provide students with the opportunity to undertake guided reading to develop their own portfolio of learning to understand the core principles and enhance transferable skills and knowledge. The VLE will be used to provide access to online resources, lecture notes and external links to websites of interest and for classroom tests.

Classroom tests (individual MCQs) support as continuous diagnostic tests, providing students with an opportunity to critically apply the principles covered by this module and enhance understanding using a range of literature sources. Model MCQ questions will be discussed in lectures/workshops. The classroom setting will provide students with the opportunity to critically analyse and apply problem solving-skills within the subject from lectures/tutorials and related reading.

Students will undertake coursework based on an individual task concerning either cosmetic or pharmaceutical formulations. Guidance on the individual task will be provided in the workshop. Students will also prepare and deliver an oral presentation on pharmaceutical formulation which will enable student-led research engagement, critical application of knowledge and problem-solving skills within the core subject, communication to a specialist audience and time management.
Students will develop an individual formative report in preparation for the formulation task and feedback will be provided on this so it can be taken on board for the individual summative task.

Mode of Assessment

Type	Method	Description	Weighting
Summative	Classroom test	Fundamentals of Formulation Development and Manufacturing Technology	20%
Summative	Presentation	Oral presentation: Formulation task	20%
Summative	Coursework - Written	Cosmetic or pharmaceutical task	60%
Formative	Classroom test	Model questions in lecture/workshop - 30 mins	N/A
Formative	Coursework	Formulation report - 1000 words	N/A

Reading List

To access the reading list for this module, please visit https://bradford.rl.talis.com/index.html

Please note:
This module descriptor has been published in advance of the academic year to which it applies. Every effort has been made to ensure that the information is accurate at the time of publication, but minor changes may occur given the interval between publishing and commencement of teaching. Upon commencement of the module, students will receive a handbook with further detail about the module and any changes will be discussed and/or communicated at this point.

https://bradford.ac.uk