

Module Details	
Module Title	Integrated Laboratory and Skills Development 1
Module Code	PHA4015-D
Academic Year	2024/5
Credits	40
School	Life Sciences (Faculty-wide)
FHEQ Level	FHEQ Level 4

Contact Hours	
Type	Hours
Directed Study	270
Laboratories	80
Practical Classes or Workshops	25
Lectures	33

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

Module Aims
<p>This module will integrate laboratory practice of preformulation and biology of pharmaceutical and cosmetic products. Students will develop skills in the safe handling of preformulation and biological experiments, in making accurate qualitative observations, quantitatively analysing results produced in the laboratory, and in reporting and interpreting experimental outcomes. Students will also develop professional and employability skills including an understanding of sustainability with an appreciation of the importance of ethical considerations and inclusivity.</p>

## Outline Syllabus

Introduction to chemical and biological hazards and risk assessments, exposure limits, COSHH. Students will develop skills in the safe handling of preformulation and biological experiments in making accurate qualitative observations, quantitatively analysing results produced in the laboratory, and in reporting and interpreting experimental outcomes.

Preformulation attributes: organoleptic properties, purity, melting, dissolution and solubility, properties of solutions, surfaces and interfaces, disperse systems, rheology, kinetics. Acids and bases, partition co-efficients, elementary medicinal compounds syntheses, spectroscopic characterisation of pharmaceutical/cosmetic compounds. Crystal and particle characterisations, thermal and chemical stability of pharmaceutical and cosmetic products.

Testing methods, such as safety and stability trials and microbiological evaluation. The main ingredient classes and excipients (polymers and colloids, surfactants, emollients, viscosity, rheology modifiers, conditioners, preservatives, sunscreens and dyes/pigments, toothpaste) will be reviewed in relation to preformulations to meet a specific product brief (with skin, hair and nails as substrates).

Undertake practical tasks in physiology, including analysis and interpretation of data. Directed resources will be used to support and reinforce teaching sessions on basic physiology concepts. Select and interpret biochemical investigations using simple enzyme kinetic data and design experiments. An introduction to the isolation/identification of bacteria and fungi by biochemical and staining techniques; aseptic culture transfer and enumeration techniques. The effect of temperature on bacterial growth and survival.

Professional and skills development: Presenting information effectively with structured and coherent arguments, monitoring and evaluating results, working individually and in groups, drawing conclusions of preformulation and biology experimental reports.

Basic mathematical manipulations. Artificial intelligence and pharmaceutical and cosmetic data analysis.

Introduction to the significance of sustainable development and 17 sustainable development goals (SDGs) in particular SDG 3. Good and health and wellbeing, SDG 4. Quality education, SDG 8. Decent work and economic growth, SDG 9. Industry, innovation and infrastructure and SDG 12. Responsible consumption and production. Students will be supported with content writing (blogs), which are integrated throughout the BSc programme.

Principles of equality, diversity, and inclusivity (EDI). Values, communication styles, beliefs and practices., inclusion and its importance in diverse pharmaceutical, nutraceutical and cosmetic sectors. Introduction to reflective writing, making use of a structured model of reflection with specific, measurable, achievable, realistic and timely (SMART) action plan, to consider personal and professional development.

## Learning Outcomes

Outcome Number	Description
01	Conduct pre-formulation experiments safely and effectively, following clear instructions and accurately recording data using appropriate scientific conventions.
02	Evaluate the appropriateness of different physicochemical properties of the ingredients and excipients in solving preformulation problems of a dosage form including kinetic stability.
03	Evaluate microbiological, biochemical and physiology experiments safely and effectively including analysis and interpretation of data.
04	Manage time and perform experiments effectively as appropriate independently or as part of a group.
05	Communicate scientific information effectively in written presentations relating to laboratory work.
06	Communicate effectively in oral presentations relating to laboratory work and the theory behind experiments.
07	Evaluate basic mathematical manipulation, artificial intelligence, and qualitative and quantitative data analysis to complete simple pharmaceutical and cosmetic data analysis.
08	Recognise the need for inclusivity and/or sustainable manufacturing at a professional set-up and demonstrate personal responsibility for self-directed learning.
09	Reflect, in writing, on experiences over the academic year on inclusivity and sustainability, using a structured model of reflection, to determine to learn from the experience and make use of Specific, Measurable, Achievable, Realistic and Timely (SMART) objectives to plan further learning needs.
10	Present layperson information (blog) based on sustainable goals pertaining to pharmaceutical and cosmetic products with appropriate citation and referencing to demonstrate skills of public communication.

## Learning, Teaching and Assessment Strategy

The module uses workshops, lectures and tutorials to teach the fundamental aspects concerning the integrated labs. Students will complete a mixture of wet and dry laboratory experiments supported by weekly online pre-lab and post-lab learning packages. These include short videos that demonstrate key skills, and a set of structured activities (reading, online VLE, quizzes, etc) that scaffold to the learning. Students will submit laboratory handbooks and reports towards a continual assessment of their progress.

Feedback is given orally both in interactive workshops and in practical sessions. Laboratory-based work will include the staff-led demonstration of practical and manipulative skills at the bench and students' experimental work. The teaching of health and safety and laboratory skills will be delivered in workshops. Laboratory skills will be taught and practised in laboratory sessions. Data analysis will be taught and practised through problem-based learning and workshops.

The laboratory sessions also provide the opportunity to gain experience in basic preformulation and biological techniques and involve working in small groups, recording and interpreting qualitative and quantitative data, working to deadlines and communication skills.

Professional and skills development:

Support the development of basic mathematical manipulations, artificial intelligence and data analytics, sustainable development goals, content writing (blog), EDI and reflection with a SMART action plan through workshops and lectures.

Formative feedback will be given on a written laboratory report in semester 1. The summative exam will assess the wider theoretical knowledge outlined in the module descriptor. Students will submit the coursework report in semester 2 evaluating their experimental results, mathematical manipulations, artificial intelligence, qualitative and quantitative data analyses and scientific report writing skills. The understanding of the theory behind the practical lab sessions, application of knowledge and the laboratory skills are assessed in a practical laboratory-based spot-viva assessment. Formative feedback will be given on content writing (blog) and reflective writing, and their respective summative versions will assess the contents as outlined in the module descriptor.

Where reassessment of the practical element is required, students will be given a data set or an opportunity to complete the practical on an alternative occasion, whichever is more appropriate.

### Mode of Assessment

Type	Method	Description	Weighting
Summative	Laboratory Report	Laboratory report	50%
Summative	Examination - oral/viva voce	Spot-viva	15%
Summative	Coursework - Written	Reflection - 1000 words	15%
Summative	Coursework - Written	Content writing (blog) - 1000 words	20%
Formative	Coursework	Formative Reflection- 500 words	N/A
Formative	Not assessed	Formative blog writing - 500 words	N/A
Formative	Not assessed	Formative lab report (500 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.*

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