

Experimental Design

Module Code:	BIS7016-B
Academic Year:	2018-19
Credit Rating:	20
School:	School of Chemistry and Biosciences
Subject Area:	Biomedical Science
FHEQ Level:	FHEQ Level 7 (Masters)

Pre-requisites:

Co-requisites:

Contact Hours

Type	Hours
Lectures	17
Tutorials	11
Laboratory	10.5
Directed Study	161.5

Availability Periods

Occurrence	Location/Period
BDA	University of Bradford / Semester 2 (Feb - May)

Module Aims

To provide a comprehensive understanding of experimental research planning, design and execution. To develop a comprehensive knowledge and understanding of major quantitative and statistical methods used in experimental design and analysis of the experimental data. To develop student autonomy in experimental research, design, planning and execution.

Outline Syllabus

Chemical, biological and physical safety regulations and practices in biomedical research, human ethics, work with laboratory animals, scientific method, hypothesis and problem driven research in the biomedical arena, design of individual experiments and research

projects, project time management and budgeting, experimental protocols, project grant applications, project report writing, Good Laboratory Practices. Quantitative and statistical methods in experimental design and analysis of the experimental data, types of data and different statistical tests, probability and sample distributions: hypothesis testing, statistical testing using t-test, simple ANOVA, non-parametric statistical tests, correlations, chi-square test, the criteria for selecting an appropriate statistical test to use, the potential misuse of statistics, power analysis and sample size in experimental design, visual representation of data, brief introduction into packages used for quantitative and statistical data analysis.

Module Learning Outcomes

On successful completion of this module, students will be able to...

- 1 Explain and critically evaluate your research project area.
- 10 Show an understanding of and ability to use quantitative and statistical methods in the designing of experiments, small research projects and in the analysis of experimental data.
- 11 Undertake critical thinking for design of individual experiments and small research projects and writing a grant application.
- 12 Demonstrate effective written skills in grant applications.
- 13 Enhance IT skills in grant writing within a short electronic document of defined format (with GANTT chart).
- 14 Exercise initiative, responsibility and independent learning.
- 15 Conduct self in a professional manner and within prevailing legislation (grant budget, GLPGMO, COSHH, Ethics, use of radioisotopes).
- 2 Critically evaluate and communicate scientific data and literature.
- 3 Critically evaluate experimental laboratory techniques.
- 4 Critically evaluate and implement the major quantitative and statistical methods used in experimental design and data analysis.
- 5 Demonstrate self-direction, and originality in a research project.
- 6 Write a grant proposal for your research project.
- 7 Understand how legislation affects experimental design and planning.
- 8 Undertake critical thinking.
- 9 Demonstrate an understanding of research and scientific method.

Learning, Teaching and Assessment Strategy

This course will be presented as a series of lectures, seminars and workshops, covering the key aspects of design of individual experiments and research projects, major quantitative and statistical methods used in experimental design and analysis of the experimental data, writing of project reports and research proposals, health and safety, ethical issues in

research and good laboratory practice. Students will be responsible for the submission of the formative and summative assignments. The summative assignments will include a computer-based exam on using quantitative and statistical methods in experimental design and analysis of the experimental data (30% of the final mark) and a grant application coursework (70% of the final mark). The summative assessments will be supported by two formative assignments. One formative assignment will be a computer based session on using quantitative and statistical methods in experimental design and analysis of the experimental data. The second assignment will be a written piece of coursework covering the key questions related to the design of the research project and preparation for its execution. Significant time in the module is allocated to directed study. Students will use this time to search and study the literature related to their project topic and to prepare the assignments. Particularly, they will build their theoretical and practical expertise in the project related field to prepare the grant applications. The supervisor's advice will be provided to achieve this goal.

Mode of Assessment

Type	Method	Description	Length	Weighting	Final Assess'
Summative	Coursework	Research grant proposal based on your own research project on a Skin & Regenerative Medicine or Biomedical Sciences topic, dependent on your course	-3500 words	70%	No
Summative	Coursework	Computer based test on using quantitative methods in experimental design and data analysis	1.5 hours	30%	Yes

Legacy Code (if applicable)

Reading List

To view Reading List, please go to [rebus:list](#).