A practical alternative to final year projects in biomedical sciences

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Context

~250 Stage 3 students from 13 bioscience degree programmes

All students undertake 40 credit research project at Stage 3

Students achieving <55% at Stage 2 are offered a “dry” project

New module offers these students laboratory experience

What do employers want graduates to be able to do in the lab?

- Competence in basic techniques: pipetting, weighing, preparing solutions
- Numeracy: confidence to perform basic calculations – concentrations & dilutions
- Accuracy and reproducibility
- Excellent organisational skills: rigorous documentation and record keeping
- Ability to trouble shoot – understanding the scientific basis of assay

Setting the scene!

You have just started work at a top biotechnology company and have been asked to prepare a product information sheet for a new batch of trypsin.

But….

documentation for previous batches has been destroyed

– you have to carry out the analysis from scratch.

equipment has been damaged

– you can only carry out a limited range of techniques.

Techniques

uv spectrophotometry

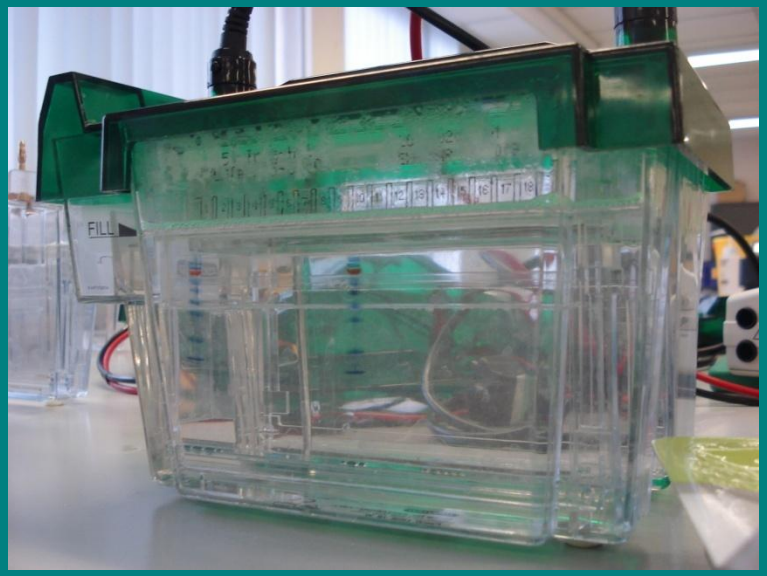
Lowry assay

BAEE trypsin activity assay

SDS PAGE

Western blotting

ELISA



Structure

Week	
1	Seminars
2	Project plan
3	
4	Lab work: 52 hours
5	(and extended essay)
6	
7	Results workshop
8	Lab report
9	
10	(Prepare oral presentation)

Where do they start?

Students are provided with:

2 trypsin samples:

- New (untested) trypsin sample
- Previously tested trypsin sample rescued from fire (label says: concentration 1.03 mg/ml, activity ~5000 BAEE units/ml)

Practical handbook containing:

- Equipment list
- Reagent list
- BASIC protocols for the 7 assays

Project Plan

Product background report summarising the properties and commercial uses of trypsin

Summary of scientific principles of assays

Summary of planned experiments

A detailed protocol for each experiment, including calculations

Documentation: risk assessments, work timetable, experimental record forms

Lab report

Product information sheet summarising the results of own assays

Lab report explaining how each result was obtained

Revisions to original protocols/risk assessments

Critical evaluation of the product information sheet – with reference to whole class results (eg statistical significance; anomalous data, supporting evidence)

What makes it different?

Encouraged to consider:

“What do I want to know? How can I find the answer”

rather than

“What do I have to do? What does it mean?”

Students have ownership – they start from “scratch”

Time to repeat experiments and make mistakes

Better than traditional project for some?

Student support

Weekly one-to-one meeting with academic supervisor

Postgraduate demonstrators

More “standardised” support

More structured format

Employability

Module designed in consultation with industrial lab manager

Introduction to GMP/Health and Safety documentation

Feedback

Student perception of skills gained during module:

proactivity
good work ethic
time management

confidence to plan experiments
confidence to carry out assays
confidence to experiment and try different approaches

Acknowledgments

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Admin team:

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Adele Hick

Statistics workshops:

Dr Tom Nye

External Speakers:

Dr Pete Bowness (Covance laboratories)

Dr Paul Graham (SCM Pharma)

Mary Baynes (MHRA)