

Centre for Bioscience, The Higher Education Authority  
Professional Development Event  
University of Nottingham  
Centre for Integrative Learning, Room 105/6  
Hallward Library, University Park Campus

## Student Research in the Biosciences: “Why?” and “How?”

### Implementing the Undergraduate Ambassadors Scheme (UAS) as a final-year project option

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The University of  
**Nottingham**



# School of Biosciences - UoN



**University Park (UP)**



**Sutton Bonington (SB)**



**Semenyih, Malaysia**

## School of Biosciences (SB & UP, 2007/08)

- **Academic staff** **75**
- **Research and support staff** **~300**
- **Teaching**

	<b>Home</b>	<b>Int.</b>	<b>Total</b>
<b>Undergraduates</b>	<b>657</b>	<b>122</b>	<b>779</b>
<b>Postgraduates</b>			
<b>taught</b>	<b>15</b>	<b>84</b>	<b>99</b>
<b>part-time research</b>	<b>6</b>	<b>1</b>	<b>7</b>
<b>full-time research</b>	<b>73</b>	<b>73</b>	<b>146</b>

# School of Biosciences Divisions



Nutritional Sciences

Plant & Crop  
Sciences

Food  
Sciences

Agr. & Env. Sciences

Animal Sciences

[Vets]

# **School of Biosciences Undergraduate Degrees**

**BSc Agriculture**

**BSc Food Science**

**BSc Animal Science**

**BSc Microbiology**

**BSc Applied Biology**

**BSc Nutrition**

**BSc Biotechnology**

**BSc Nutrition and Food**

**BSc Crop Science**

**BSc Nutritional Biochemistry**

**BSc Environmental Biology**

**BSc Plant Science**

**BSc Environmental Sciences**

**Master of Nutrition**

**BSc Food Microbiology**

**Cert. in Pre-Veterinary Science**

*(Most degrees courses can be taken with European Studies)*

# School of Biosciences Teaching

- Teaching matters co-ordinated by Learning and Teaching Committee (LTC) reporting to School Professorial Committee and School Board
- In 2005, LTC decided that UoN-B should participate in the Undergraduate Ambassadors Scheme (UAS)
- To innovate, and to alleviate pressure of running lab.-based projects



[www.uas.ac.uk](http://www.uas.ac.uk)

# **UAS - Background (History)**

- **A national scheme which provides a framework for awarding academic credits to undergraduates for engaging with schools**
- **Founded in 2002, by Simon Singh and Hugh Mason, a response to teacher shortages and reduced university applications in Science, Technology, Engineering and Mathematics (STEM) subjects**
- **Three universities (King's College London, University of Surrey, University of Southampton) in the first year: 28 Maths and Physics undergraduates**
- **2007/08, UAS participation risen to ~700 undergraduates**
- **110 departments in 42 universities in UK and Ireland, including Biosciences, Chemistry, Geography, Geology, Languages, Maths, Music and Physics students**



# **UAS - Background (Aims)**

- **To provide undergraduates with key transferable skills valued by employers. communication, presentation, team-working, active-listening, and time management skills**
- **To provide undergraduates with subject-specific skills, gained from the communication of their subject**
- **To provide undergraduates with encouragement to consider teaching careers through provision of classroom-based experience**
- **To provide school pupils - and especially those among under-represented groups in higher education - with role models and thus encourage the next generation of scientists, engineers and mathematicians**
- **To provide school teachers with additional classroom-based support, including access to University resources**



# **UAS - Background (Credit allocation)**

- **University departments and tutors adapt UAS for local requirements**
- **General guidelines and support documentation provided by UAS**
- **Students are expected to complete an initial day of training within their own university (minimum), then placed in a local school**
- **Students are expected to work closely with their teacher/mentor, provide teaching/practical assistance and conducting special projects**
- **Placement terms are non-prescriptive, UAS students can work with any age-group according to their university department's wishes**
- **Assessment is based on a portfolio: e.g. written report + presentation**
- **General details at [www.uas.ac.uk](http://www.uas.ac.uk)**



# **UAS - Background (Implementation)**

**...LTC sought a suitable UAS co-ordinator...**

## **Pre-implementation concerns (mine, and others)**

- **Time**
- **Academic equivalence to lab.- or lit.-based projects**
- **Colleague-engagement in five Divisions**
- **School-engagement**
- **Student recruitment (and quality)**

# **UAS - Background (Implementation)**

- **Attended UAS roadshow (Nov. 2005, met UAS staff and students)**
- **Spoke with colleagues in Physics (Penny Gowland)**
  - F33AR1    Communicating Science (Physics)**
  - G13UAS    Communicating Mathematics (15 Credits)**
  - AA3002    Communicating & Teaching Languages for Undergraduate Ambassadors**
  - R23137    Communicating & Teaching German for Undergraduate Ambassadors**
- **Decided a 10 Credit, Level 3 course was probably inappropriate**
- **Elected to implement a 2-stage UAS scheme:**
  - Part 1: COMMUNICATING BIOSCIENCES module (10 Credit, Level 2)**
  - Part 2: UAS proper (40 Credit Level 3, alternative to lab.- or lit.-based honours project)**
- **Ambitious, final-year projects at UoN-B are worth 40 credits (23.3% of the final degree mark)**
- **Missed a 30 credit precedent (Phil Langton, Physiology Dept., Bristol) !**

# Part 1: Communicating Biosciences

- **10 Credit module D224E2; 100% coursework**
- **2006/07, enrolled 24 (capped)**
- **2007/08, enrolled 48; 2008/09, currently at ~80**
- **Series of lectures, group/individual tutorials and workshops**
- **“Written” and “non-written” presentation skills; reflective learning**
- **Written: writing skills, guest journalist, produce newspaper articles from primary research papers**
- **Non-written: lesson plans, input from PGCE and WP Teams, debate**
- **Reflective learning: (anon.) weekly learning journal, final retrospective:  
...designed by Martin Luck  
...highly rewarding component**
- **Introduction to UAS (given by former UAS students in 2007/08)**

# Part 1: Communicating Biosciences

- **Multiple QAA benchmarking statements, 16 subject curriculum maps...**
- **Learning outcomes:**
  - 1. gain conceptual understanding of communicating biosciences**
  - 2. gain confidence in communicating their subject**
  - 3. develop technical, organisation, interpersonal, reflective skills**
  - 4. understand individual needs within diverse audiences differ**
  - 5. develop skills to engage people with biosciences**
  - 6. acquire, interpret, critically analyse primary research**
  - 7. gain skills in peer-assessment**
- **These map to 18 of the 43 specific skills defined within the QAA Biosciences\* benchmarking, including:**
  - 1. Subject Knowledge**
  - 2. Generic Skills**
  - 3. Graduate and Key Skills**
  - 4. Intellectual Skills**
  - 5. Numeracy, Communication and Information Technology Skills**
  - 6. Interpersonal and Teamwork Skills**
  - 7. Self-management and Professional Development Skills**

## **Part 2: Biosciences UAS (Recruitment)**

- **From 2006/07, 5 recruited (4 + 1 deferred)**
- **From 2007/08, 9 recruited (7 + 1 deferred + 1 BSc Microbiology...)**
- **2008/09... ?**

## **Part 2: Biosciences UAS (Recruitment)**

- **School recruitment 2007**
  - 3 students expressed preference for secondary (one specified)**
  - 1 “ primary**
  - Contacted schools late (September)**
  - Helped by WP Team contacts**
  - Visited all schools (average meeting c. 1 hr)**
  - All schools approached agreed, bar one late withdrawal**
  
- **School recruitment 2008**
  - 5 students expressed preference for secondary**
  - 2 “ primary**
  - 1 “ FE (adult)**
  - Contacted most schools in June/July**
  - Helped by WP Team contacts**
  - Visited all schools/colleges (average meeting c. 1 hr)**
  - Three of four 2007 schools approached, all agreed, two used**
  
- **Distributed UAS material, guidelines, and an example project (in 2008)**

## **Part 2: Biosciences UAS (Placement)**

- **School Placement Timeline:**

Oct. WP Team training (0.5 day)

Oct. WP Team co-ordinate CRB checks

Oct. Pre-half term school/mentor visit for student

Oct. PGCE Team training (0.5 day)

Nov-Dec. First placement block (6 \* 4 hr sessions min.)

Jan-Mar. Second placement block (6 \* 4 hr sessions min.)

Total workload for BSc project is a guideline 400 hours

Ongoing Meetings with UAS co-ordinator to discuss progress

- **School Placement Activities:**

Relatively “non-prescriptive”

Student quickly takes ownership of relationship

observation > assistance > delivery > extra-curriculum work,

e.g. science clubs, revision classes



## **Part 2: Biosciences UAS (Assessment)**

- **Assessment:**
  - 30% Dissertation (Marker 1, me)**
  - 30% Dissertation (Marker 2, “home” Division)**
  - 30% “Research Activity”**
    - Independence/initiative**
    - Organisation**
    - Technical competence (i.e. communication skills)**
    - Perseverance**
    - Critical ability**
  - 10% Oral Presentation**
- **Dissertation (amended Sept. 2008):**
  - 10% Abstract**
  - 20% Literature Review**
  - 30% School Placement Report (i.e. a description of teaching activities/lesson plans, quantitative/qualitative analyses)**
  - 20% *Retrospective***
  - 10% Written Expression**
  - 10% References**

## Part 2: Biosciences UAS (Testimonies)

- **Student testimonies:**

1. “Before participating in the UAS... I lacked confidence and believed that I was not capable or clever enough to teach. Throughout the scheme I have had the opportunity to teach or tutor a variety of audiences. Ensuring that I had prepared and rehearsed lessons properly, along with the practice of delivering the lessons has helped improve my confidence. As a result, I have come to reconsider teaching as a career option.” Currently on a year out, intends to take PGCE in 2009/10

2. “The UAS project has been an inspiring learning curve. Over the 20 weeks of organising, attending and reflecting upon the school placement I have made steady and some surprising progress with my communication skills. The project, as no doubt was the aim of the coordinators, seemed to be a successful compliment to the prerequisite module, Communicating Biosciences. Despite being a pharmaceutical scientist, I have always maintained that writing and communicating is my calling...”  
Was recently was appointed as an Editor by Thomson-Reuters, London

- **Teacher testimonies:**

“[UAS] programme worked really well this with X co running our science club. Is there a formal evaluation? Can we participate again next year? Please - it was really great !”

## School Teacher Testimony

1. At the start of my (UAS student) school placement it was decided through negotiation by Mrs S. Pearson and myself that I would teach the national curriculum to six or seven of the high ability children in class 7. One of the reasons for this was to give the children more individual time/attention with a student that has an understanding of science. Have you witnessed any evidence to suggest that the children have benefited from this?

The children in this group seem to have more confidence when discussing scientific concepts. They also appear to grasp new concepts more easily usually by relating it to prior learning or knowledge.

2. The children have been doing an investigation, which involves them working together as a team. They have also completed experiments which involved group work. Have you witnessed any evidence, in the classroom, to suggest that they have benefited from this?

This group of children have more confidence when designing an experiment. They are more able to discuss what they want to find out and know how to go about it. They can make predictions and observe and measure the results. They are more able to draw conclusions.

3. Between six and seven of the high ability children have had weekly science lessons with the 'Undergraduate Ambassador Scheme' student throughout terms 1 and 2 in 2007/8. Is there any evidence that their test/SATS results have improved as a result?

3 of the children have increased their SATS level by 1 sub-level  
1 of the children has increased his SATS level by 2 sub-levels  
The children all increased their SATS scores by between 3 and 13 marks.

4. Have you witnessed any other evidence to suggest that the children who have spent time in the classroom with the UAS student have benefited?

The children seem much more confident generally. In science they are more confident of their own ability and more ready to 'take a risk' when answering questions or tackling new work.

## **Part 2: Biosciences UAS (Issues arising and in-play)**

- **Support from mentors and schools differed widely, as expected. It was still possible to academically judge students (2:2 – 1<sup>st</sup> Class)**
- **Not all colleagues fully-aware of UAS, some concern expressed over how to brief external examiners on equivalence (cross-Division issue)**
- **One degree course had been accredited by a professional body during the year, a significant research component needs demonstrating**
- **Minor Division-differences in assessing oral presentations**
- **Guidelines and mark-schemes adjusted slightly for 2008**
- **Transfer from eight modules to single module**
- **School of Education moderator (?)**
- **Need for a UAS external examiner (?)**
- **Can we incorporate external good-practice (e.g. Bristol experience 2004/05-2008/09, [phil.langton@bris.ac.uk](mailto:phil.langton@bris.ac.uk))**

**Questions, comments welcome...**



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# Appendix I

## Communicating Biosciences – Learning Outcomes & Benchmarking

The learning outcomes of D224E2 map to 18 of the 43 specific skills defined within the QAA Biosciences benchmarking statement document\*, including, “[1]Subject Knowledge”, “[2],[3]Generic Skills”, “[4]Graduate and Key Skills”, “[5]Intellectual Skills”, “[6],[7],[8]Numeracy, Communication and Information Technology Skills”, “[9],[10]Interpersonal and Teamwork Skills”, and “[11],[12],[13]Self-management and Professional Development Skills”. In general terms, the learning outcomes of the module enable students to: (1) gain an understanding of conceptual issues in communicating biosciences, (2) gain confidence in communicating their subject, (2) develop technical, organisational, interpersonal, and reflective skills, (3) understand how the needs of individuals within a diversity of audiences can differ, (4) develop the skills to engage people with the biosciences; (5) acquire, interpret and critically analyse primary research material, (6) critically assess the ability of their peers to acquire, interpret and communicate complex ideas.

[1] “engagement with some of the current developments in the biosciences and their applications, and the philosophical and ethical issues involved. Awareness of the contribution of biosciences to debate and controversies, and how this knowledge and understanding forms the basis for informed concern about the quality and sustainability of life” (QAA, 2002, p. 4)

[2] “the ability to read and use appropriate literature with a full and critical understanding, while addressing such questions as content, context, aims, objectives, quality of information, and its interpretation and application” (QAA, 2002, p. 4)

[3] “the capacity to give a clear and accurate account of a subject, marshal arguments in a mature way and engage in debate and dialogue both with specialists and non-specialists” (QAA, 2002, p. 4)

[4] “intellectual skills; practical skills; communication skills; numeracy, communications and information technology (C & IT) skills; interpersonal and teamwork skills; self-management and professional development skills” (QAA, 2002, p. 4)

[5] “analysing, synthesising and summarising information critically, including published research or reports”

[6] “receiving and responding to a variety of sources of information: textual, numerical, verbal, graphical” (QAA, 2002, p. 5)

[7] “communicating about their subject appropriately to a variety of audiences using a range of formats and approaches” (QAA, 2002, p. 5)

[8] “using the internet and other electronic sources critically as a means of communication and a source of information” (QAA, 2002, p. 5)

[9] “identifying individual and collective goals and responsibilities and performing in a manner appropriate to these roles” (QAA, 2002, p. 5)

[10] “evaluating performance as an individual and a team member; evaluating the performance of others” (QAA, 2002, p. 5)

[11] “developing the skills necessary for self-managed and lifelong learning (e.g. working independently, time management and organisation skills)” (QAA, 2002, p. 5)

[12] “identifying and working towards targets for personal, academic and career development” (QAA, 2002, p. 5)

[13] “developing an adaptable, flexible, and effective approach to study and work” (QAA, 2002, p. 5)