Embedding and Threading Employability Throughout the Natural Science Degree Course

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An overview of this talk:

- Context: Natural Science Degree
- Embedding Skills
- Threading Skills
- UoL: Transferrable Skills Framework
Context:
Natural Science Degree
Our Degree

- “Natural Sciences Plus”
  - Biology, Chemistry, Earth Sciences, Mathematics, Physics
- A research-based undergraduate degree developed ‘from scratch’.
- Bespoke ‘Core’ modules are based on interdisciplinary themes
- Emphasis on employability and transferrable skills in each module via authentic assessment.
Core Modules (75 credits)

- Research-based / ‘Problem’-based Learning (PBL)
- Workshops (‘Facilitation Sessions’)
- Interactive Lecturers (‘Expert Sessions’)
- 65% Continuous Assessment / 35% Exam

Support Modules (45 credits)

- Laboratory Science (15 credits)
- Mathematics for Science (10 credits)
- Methods and Techniques (Skills & Computing; 10 credits)
- Electives (10 credits)
Embedding Skills
‘Obvious Skill Sets’ for a science degree

Laboratory Skills
- Year 1-3: Chemistry, Biology, Physics and Earth Sciences
- Experimental techniques
- Analysing data / errors
- Keeping professional laboratory notes

→ Core module, Project (year 3 and 4)

Mathematics for Science
- Year 1-3: Covers topics from a year 1-2 of standard physics degree (inc statistics and probability)
- Variably paced
- Competency based and Applications questions

→ Core module, Project (year 3 and 4)

Computing
- Year 1: R (graphical presentation), Maple (algebraic solution package)
- Year 2: Python, html, css.
- Year 3: Further Python (projects)
- Year 4: Microprocessor Programming (arduino), NetLogo, Maple (projects)

→ Core module, Laboratory, Project (year 3 and 4)
Additional Transferrable Skills

Core modules

- ‘Deliverables’ assess scientific content AND skills.
- **Standard:** essays, reports, proposals, presentations, vivas etc for a variety of audiences.
- **Novel:** Expert Witness in a Courtroom, podcasts, websites, videos.

Support Modules (Methods and Techniques)

- Sessions are timed so that support is provided before specific skills are required in the Core courses.
- Reflective Practice (Individual and Group) session support general research and team working skills.
- Research Seminars (year 1-4): *Blog, Press Release, Précis, Précis + Biography*
Threading Skills
## MnT: Skills Strands

### Communication
- Report and Essay Writing - The Basics
- Improving Your Writing Style
- Report Writing Critical Review
- Oral Presentations I+II

### Effective PowerPoint Presentations
- Advanced Report Writing (Formal Lab Report)
- Academic Posters
- Creating a Podcast

### Large Scale Report Writing
- Video Planning
- Video Equipment
- Video Post Production

### Information Handling
- Reading Scientific Literature
- Research Techniques
- Laboratory Notes Critical Review
- Modelling and Dimensional Analysis

### Exam Technique
- Exam Technique I
- Exam Technique II
- Lifelong Learning
- Scientific Method
- Scientific Ethics

### Information Literacy
- Library Induction
- Intro: Finding and Citing info
- Advanced info retrieval + personal info management
- Info Literacy Refresher
- Advanced info retrieval + personal info management

### Employability
- A Degree is Not Enough
- Get Ahead Get Experience
- Articulating Skills and CV Development
- Countdown to Graduation
- Preparing for a Job Interview

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*The Centre for Interdisciplinary Science*
Core Deliverable Type Progression

Report Types
- Audience type becomes more specific
- Write for your markers → Write Educational Materials, Business Leaders, Experts in the Field
- Emphasis on writing increasingly concisely

Presentation Types
- Individual and group presentations; with and without support materials
- Interviewed for a ‘zine → Presentation to Funding Body → Conference Poster → Expert Witness → Viva → Lecture

Novel Types
- Website ‘copy’ → Full Website (design and present)
- Podcast → Video
- Research Seminars (year 1-4): Blog, Press Release, Précis, Précis + Biography
Science in Context (Year 3)

Research Literature:
Models research groups in both academia. Seminars where students present summaries of research in the scientific literature.

Journal of Interdisciplinary Science Topics (JIST):
Models the entire academic publication process starting from writing their own short academic research papers, through the editing and review process, to finally publishing their paper in an online journal.

http://www.physics.le.ac.uk/jist/index.php/JIST/issue/current
UoL: Transferrable Skills Framework
Where could we do more?

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<th>Interpersonal</th>
<th>Exploration and Implementation</th>
<th>Self-management</th>
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<tr>
<td>Communication</td>
<td>Researching and Analysing</td>
<td>Learning, Improving and Achieving</td>
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<td>Teamwork</td>
<td>Problem Solving and Decision Making</td>
<td>Resilience, Adaptability and Drive</td>
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<td>Leadership and Supervising</td>
<td>Planning and Organising</td>
<td>Digital Skills</td>
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**Interpersonal**
- Virtual/remote networking (available via IScience society etc)

**Exploration and Implementation**
- Business analytical models (available through Management Elective)
- Working globally (available via IScience society, looking to include McMaster)
- Works to a budget (available through Management Elective)

**Self-management**
- Manages personal online identity (available from Science Communication Elective)
Additional Slides
## Depth and Breadth of Scientific Content

<table>
<thead>
<tr>
<th>Year 1</th>
<th>Prophets and Powers</th>
<th>Science of the Invisible</th>
<th>Biosphere</th>
<th>Near Space</th>
<th>Braining IT</th>
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<th>Year 2</th>
<th>Time and Energy</th>
<th>Habitable Worlds</th>
<th>Molecules by Design</th>
<th>Forensics</th>
<th>Man and Machines</th>
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<td></td>
<td>Energy in Physics and Chemistry</td>
<td>Astrobiology</td>
<td>Chemistry in Drug Design</td>
<td>Forensic Science</td>
<td>Biophysics, Physiology and Metabolism</td>
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<tr>
<th>Year 3</th>
<th>Evolution</th>
<th>Nanoscale Frontiers</th>
<th>Communication Science</th>
<th>Project</th>
<th>Earth Through Time</th>
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<tbody>
<tr>
<td></td>
<td>Evolution</td>
<td>Molecular Cell Biology and Nanoscience</td>
<td>Electromagnetism and Cell Communication</td>
<td>(30 credits)</td>
<td>Paleoclimate and Climate Modelling</td>
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<tr>
<th>Year 4</th>
<th>Virtual Worlds</th>
<th>Complex Systems</th>
<th>Advanced Study Topic</th>
<th>Project</th>
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<td>C++, IDL, Numerical Methods, Fractals and Chaos</td>
<td>Complex Systems via Agent Based Modelling in NetLogo</td>
<td>Literature Research Project</td>
<td>(60 credits)</td>
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In each year the module topics range over scales from microscopic to macroscopic. Each year takes these topics to a deeper level.
THE Awards Winner