



## Succeeding in STEM Challenges & Opportunities

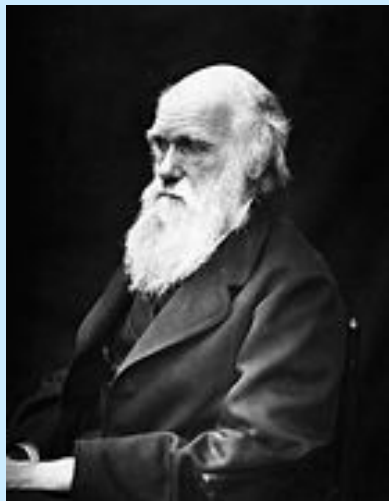
**Dr Neville H McClenaghan**

Head of School of Biomedical Sciences  
University of Ulster

COO Diabetica Limited

Succeeding in STEM – 23 June 2009, Innovation Centre, NI Science Park, Queen's Island, Belfast

## Evolution and innovation...



“In the long history of humankind (and animal kind, too) those who learned to collaborate and improvise most effectively have prevailed.”

“It is not the strongest of the species nor the most intelligent that survives. It is the one that is the most adaptable to change.”

**Charles Darwin**  
(200th birthday, 2009)



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## Evolving to face modern challenges...



- Over-reliance on the public sector for employment is not sustainable
- Imperative that NI understands the skill base needed to build the developing knowledge-based economy
- Businesses must be competitive and able to respond to a fast-changing, technology-driven world
- Need appropriate systems for education and training, encouraging innovation and entrepreneurship

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## STEM drives innovation...



Imagining a world without STEM...

...is like imagining a world  
without innovation

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## Keys to success...



- Increasing public awareness, understanding, and appreciation of STEM
- Dispelling myths surrounding STEM and enhancing the image of STEM from early schooling
- Educating the whole population about employment opportunities for those holding STEM qualifications
- Case studies and role models of STEM success and national advocates and champions of STEM
- Addressing shortage of STEM graduates and importantly STEM teachers

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## In an increasingly competitive world...



**Is fundamental science education compulsory?**

**What does the future hold for a school leaver without STEM?**

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## STEM is everywhere...



Apple iPhone



USB pregnancy test

*...but often taken for granted*

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## Importance of STEM...



### **Technology and innovation can help to:**

- Ensure public investment in research (grants, charities etc.) is returned to the public
- Improve standard of living
- Enhance productivity
- Create new opportunities for industries and jobs
- Enhance public services
- Create competitive NI products for global markets

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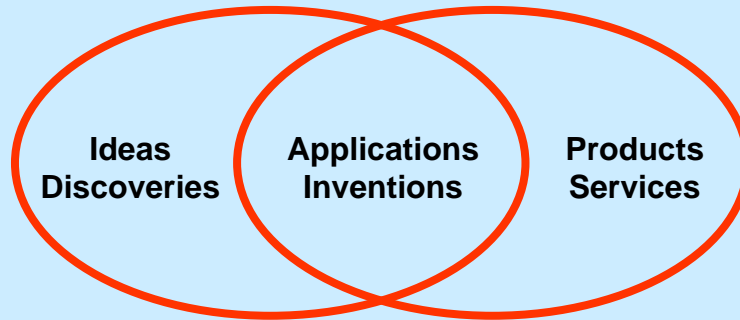
## Technology Transfer...



SCIENCE

TECHNOLOGY

COMMERCE

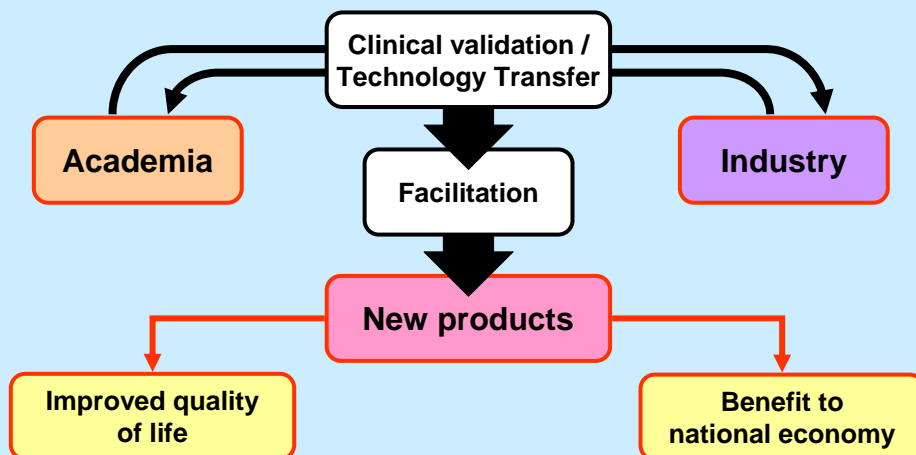


BENCH

BEDSIDE

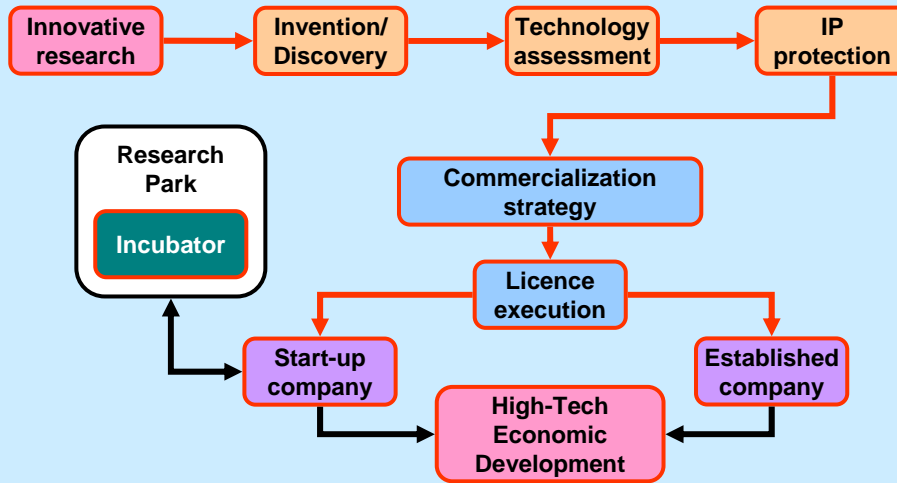
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## Development of new technologies...



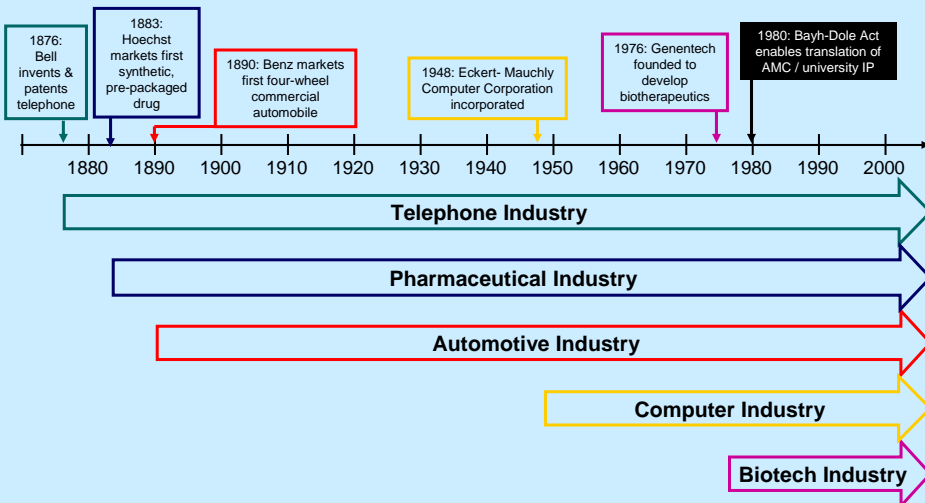
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## Research & commercialization...



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## History of IP commercialization...



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## Biopharma fuels economic growth?

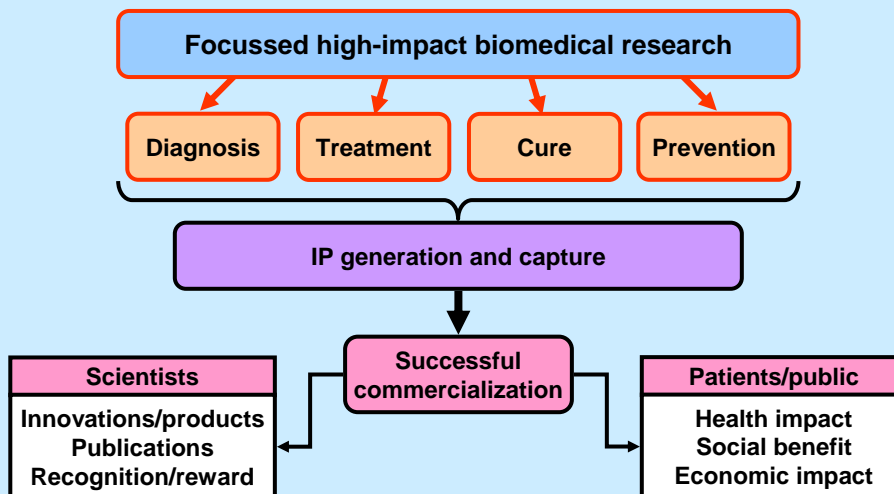


### US Biopharmaceutical Industry (2003-2004)

- Directly created 407K jobs and 2.3M in associated industries (>2% of total US employment)
- Produced \$64B direct output or ~\$173B when impact measured across all sectors
- Will grow to reach \$350B output with a total employment of 3.6M in 10 years
- Funneled some \$25B to government and public services through tax revenues

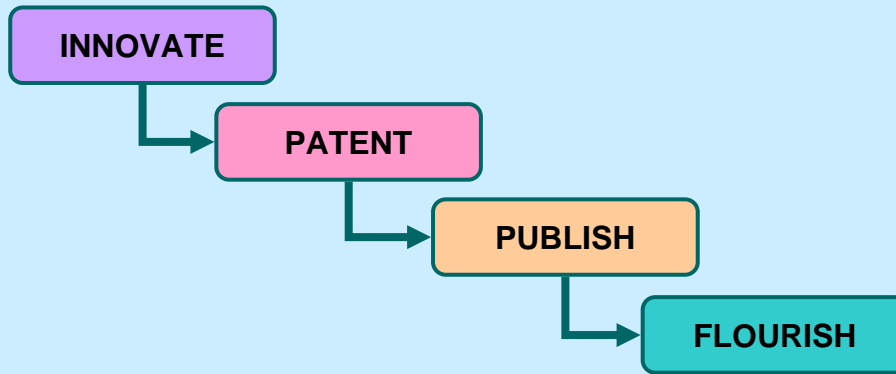
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## Targeted research for Biopharma...



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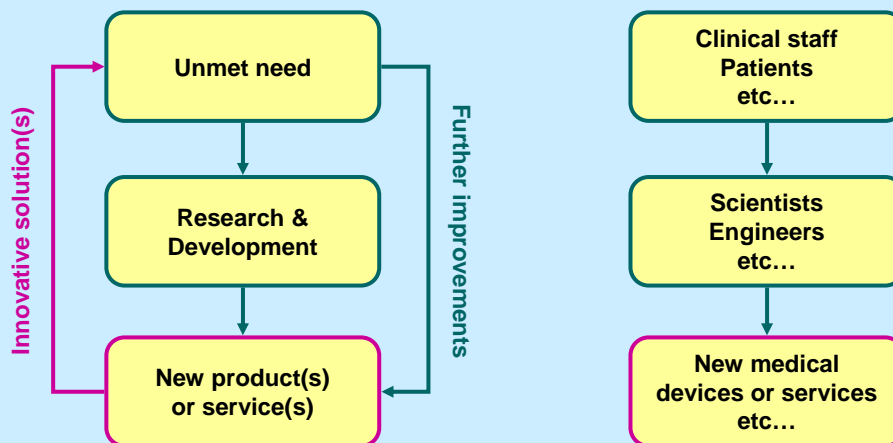
## Academic entrepreneurship...



... and Intellectual Property (IPR) is the currency of innovation...

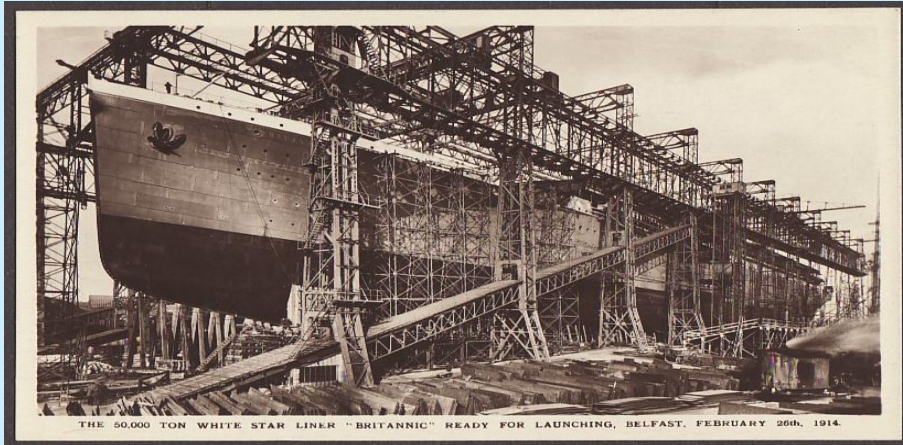
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## Innovations for markets...



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## Can this really happen in NI?



*...remember our history and heritage*

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## Biotech tradition...



**Officially licensed in 1608 by King James I**

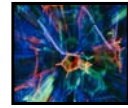
- **Oldest licensed whiskey distillery in world !**

**In 1784 the Bushmills Distillery became officially registered company**

- **First biotechnology company in Ireland !**

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Can this really happen in NI?



**There is no geographical monopoly  
on a good idea!**

**The world is getting increasingly  
smaller with time**

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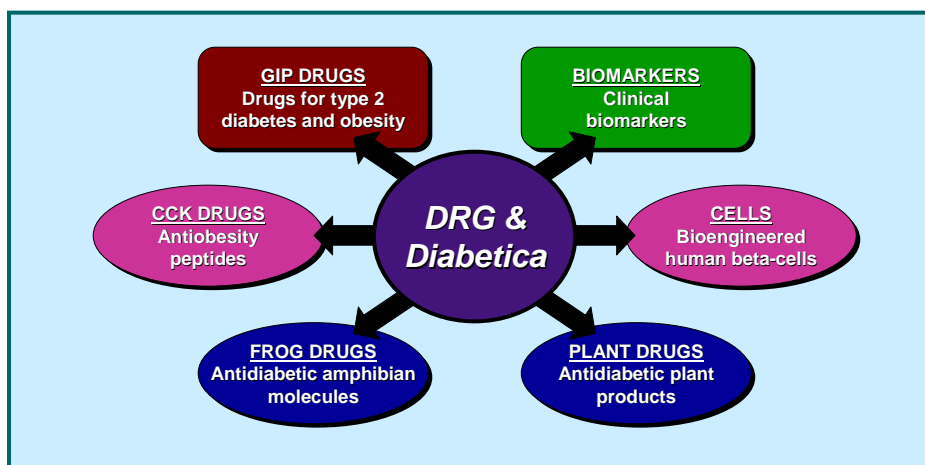
***Diabetica***



- Innovative spin-out company from *University of Ulster* established in 2004
- Proprietary technologies initially developed by world-renowned *Diabetes Research Group* at *Biomedical Sciences Ulster*
- Focused on innovative diabetes and obesity therapeutics with strong research portfolio and intellectual property position
- Recent \$41M deal with *Amylin Pharmaceuticals Inc*, a world leader in diabetes therapeutics taking *Diabetica's* first GIP-derived drug to market

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# Diabetica



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# Diabetica



Finbarr O'Harte; Peter Flatt; Neville McClenaghan

*Recipient of  
2008 pan-European  
ACES Award for  
Academic Enterprise  
for Innovation  
in Life Sciences*

For more information  
please visit our website  
[www.diabetica.co.uk](http://www.diabetica.co.uk)

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## Convergent technologies...



USB pregnancy test

### Convergence and integration

- Discovery of biologic for tests
- Biologic assay development
- Engineering & miniaturization
- Design of user-friendly device
- Materials & packaging
- IT & software solution

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## STEM for the future...



**Innovative industries can't be grown  
without STEM skilled employees**

**Graduates from medicine and other  
professions cannot address  
this fundamental need**

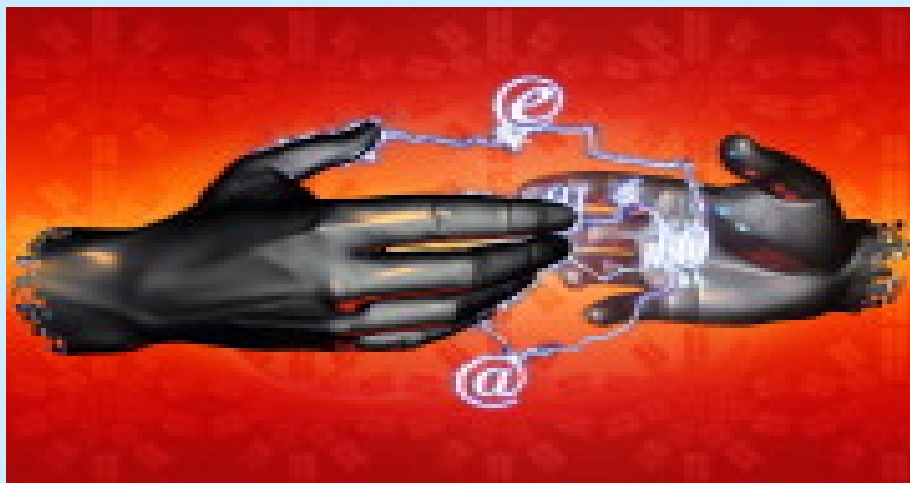
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## Innovation and invention is key...



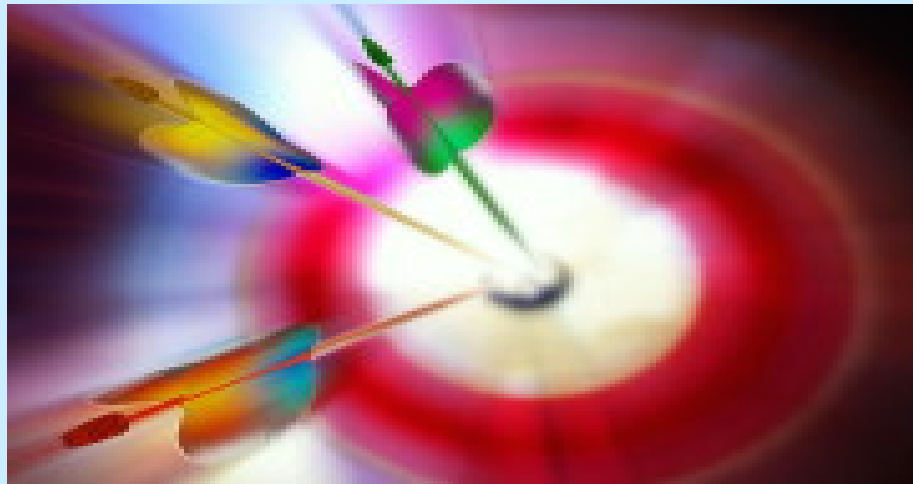
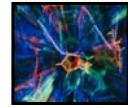
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## Strategic co-operation & partnerships...



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## Requiring clear vision and targets...



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## Biomedical Sciences Ulster...



**Takes Biosector Skills, Education, and Training  
very seriously indeed...**



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**Understanding  
Bioanalytical  
Chemistry**

Principles and Applications



Victor A. Gault and Neville H. McClenaghan

WILEY-BLACKWELL

*New International Textbook*

**Understanding Bioanalytical Chemistry  
Principles and Applications**

**VA Gault & NH McClenaghan**  
**Wiley-Blackwell**

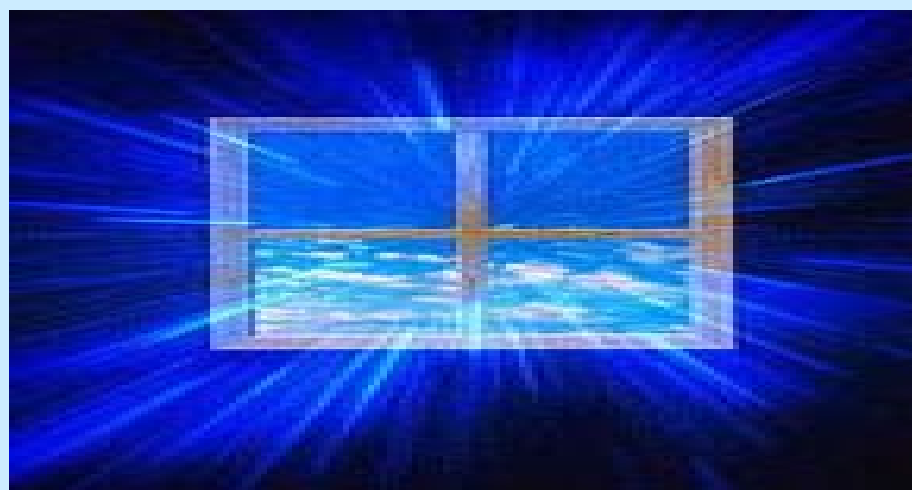
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**NI future based on STEM is bright...**



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## Succeeding in STEM Challenges & Opportunities

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### Full time undergraduate programmes

- Biology (BSc Hons) – with DIS/DAS – UCAS C100
- Biomedical Science (BSc Hons) – UCAS B992
- Biomedical Science (BSc Hons) – with DIS/DAS – UCAS B991
- Biomedical Science (BSc Hons) – with DPP – UCAS B990
- Dietetics (BSc Hons) – UCAS B460
- Food and Nutrition (BSc Hons) – with DIS/DAS – UCAS B450
- Human Nutrition (BSc Hons) – with DIS/DAS – UCAS B400
- Optometry (BSc Hons) – UCAS B510
- Pharmacology (BSc Hons) – with DIS – UCAS B210
- Pharmacy (MPharm) – UCAS B230

### Part time undergraduate programmes

- Applied Biosciences (BSc Hons)

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**Postgraduate programmes – Page 1 of 2**

- Graduate Certificate in Biomedical Science
- MSc Biomedical Science
- MSc Biomedical Science (Cellular Pathology)
- MSc Biomedical Science (Clinical Chemistry)
- MSc Biomedical Science (Haematology and Transfusion Science)
- MSc Biomedical Science (Medical Microbiology)
- MSc / Postgraduate Diploma in Pharmaceutical Sciences
- Postgraduate Certificate / Postgraduate Diploma / MSc Food Regulatory Affairs

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**Postgraduate programmes – Page 2 of 2**

- Postgraduate Diploma / MSc Biotechnology
- Postgraduate Diploma / MSc Dietetics
- Postgraduate Diploma / MSc Food Biotechnology
- Postgraduate Certificate / Postgraduate Diploma / MSc Forensic and Legal Medicine
- Postgraduate Diploma / MSc Human Nutrition
- Postgraduate Certificate in Veterinary Public Health
- Postgraduate Certificate Forensic Studies
- Postgraduate Diploma / MSc Cataract and Refractive Surgery (Theory)

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### Contact details

- For further information on Biomedical Sciences Ulster please visit our websites:
  - <http://www.biomedsciencesulster.com/>
  - <http://biomed.science.ulster.ac.uk/>
- Or contact the School Office:
  - Room W1100, School of Biomedical Sciences, University of Ulster, Cromore Road, Coleraine BT52 1SA, Northern Ireland
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