

One of the world's top 250 universities (*Times Higher Education* 2019)



University  
of Dundee

## Developing graduate employability in a subject context

Accreditation and skills development in the  
biological sciences

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April 7<sup>th</sup>, 2019



# The issue

- Employers have long complained that graduates from life sciences degrees were not 'fit for purpose'
  - 'they know a lot but don't know what to do with it'
  - Laboratory and field skills were missing
  - An understanding of the 'real world' was missing
    - *Bearing in mind that many life science graduates do not directly practice their science post-graduation*
    - *That there are many roles where scientific knowledge is important, but the role is actually one of manufacturing and management*
    - *That there are many other roles where it is the problem solving and evidential skills which are important.*



# What do employers actually want?

- Two ways to look at this
  - Pharmaceutical and research employers: ABPI Core Graduate Skills
  - 'Generic skills for the (scientific) workplace'
- Core skills needs have changed over time, but the core needs remain:

ABPI Reports	2005	2008	2015	
Mathematics	X	X	X	↑ ↑
Practical Skills	X	X	X	
<i>In vivo</i> skills	X			
Chemistry/Broader Scientific	X	X	X	
Communication Skills	X		X	
Computational Analysis	X			
Modular degrees/Rigour	X	X		
Team working			X	
Application of knowledge			X	↑



# It Takes More Than A Major:

## *Employer Priorities for College Learning and Student Success*

Key findings from survey among 318 employers

Conducted January 9 – 13, 2013

*for*



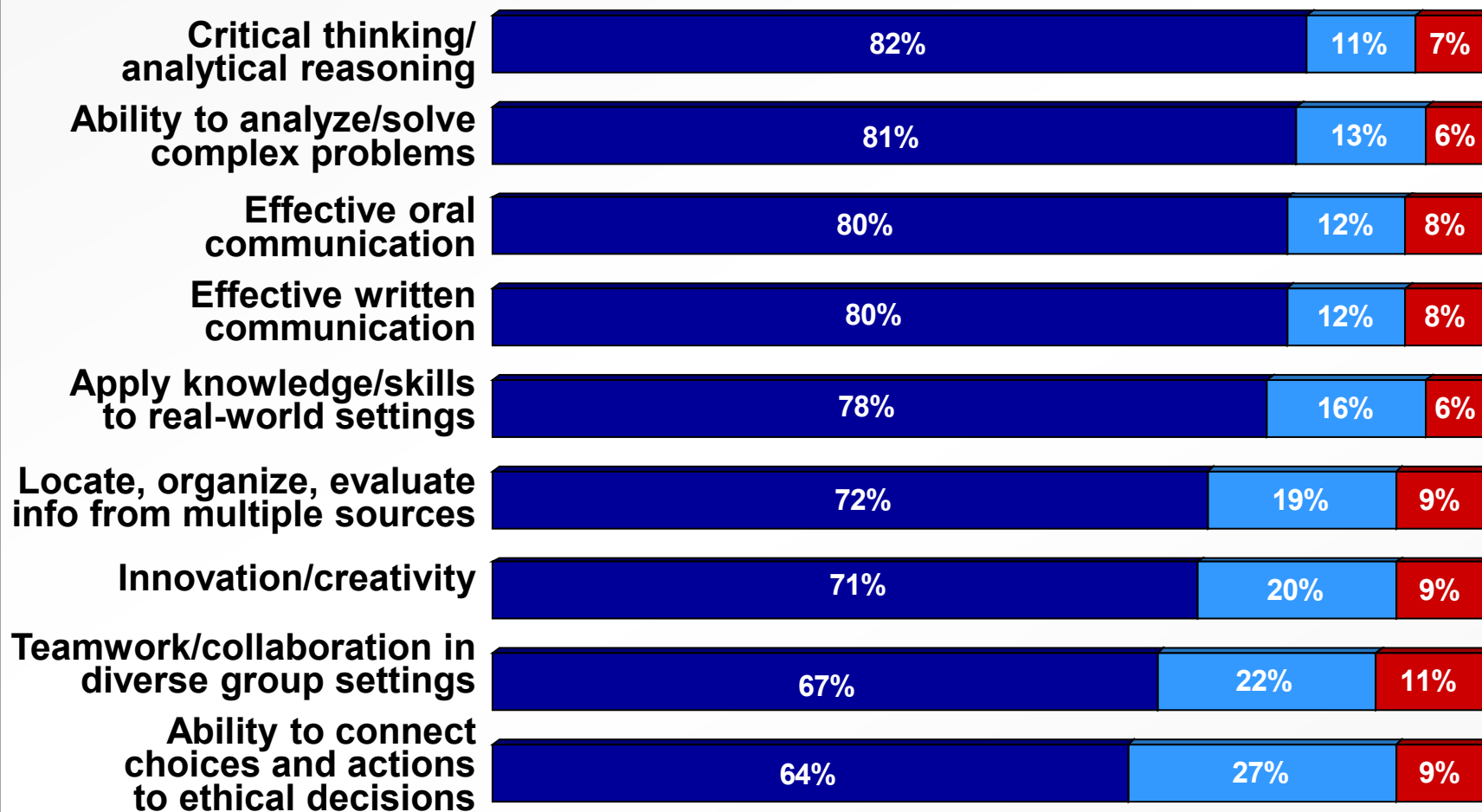
*Association of American Colleges and Universities*

# Key Findings

- ◆ **Innovation is a priority** for employers, and they report that the challenges their employees face today are more complex and require a broader skill set than in the past.
- ◆ Employers recognize **capacities that cut across majors** as critical to a candidate's potential for career success, and they view these skills as **more important than a student's choice of undergraduate major**.
- ◆ Employers recognize the **importance of a liberal education** and the liberal arts. The majority agree that having both field-specific knowledge and skills and a broad range of skills and knowledge is most important for long-term career success.
- ◆ Employers endorse education practices that involve students in active, effortful work and the **application of skills**.
- ◆ Employers express **interest in e-portfolios** and **partnerships** with colleges to ensure college graduates' successful transition to the workplace.

# Majorities of employers want colleges to place more emphasis on selected outcomes.

■ More emphasis than they do today   ■ The same emphasis   ■ Less emphasis





# Degree Accreditation

*An overview*





# Degree Accreditation Programme



Two distinct forms of accreditation:

**Advanced Accreditation** recognises academic excellence in the biosciences, highlighting degrees which contain a significant research element and educate the future leaders of research and development

**Accreditation** follows an independent and rigorous assessment of degree programmes which contain a solid academic foundation in biological knowledge and key skills, and prepare graduates to address the needs of employers







# Brief History of Development

## **Advanced Accreditation:**

- Chain of STEM reports highlighting skills gaps within the biosciences, particularly in research roles
- Two years of consultation and development (starting in 2010) with input from the community including OLS, BIS, UKCES, BBSRC, ABPI, BIA, employers, HEIs and Learned Societies
- Pilot programme completed in March 2012, focusing on biochemistry
- Government funding secured from UKCES, allowing a launch in **October 2012**

## **Accreditation:**

- Six months of consultation with key stakeholders, including two large workshops with the community.
- Pilot programme run between September 2014 and December 2014
- Refinement of criteria
- Full launch in **March 2015**





# Accreditation Criteria

1. Final year work, the “capstone experience”
  - *The capstone experience will integrate and develop the skills and knowledge gained in earlier years; bring reflection and focus to the whole of the degree experience; and provide students with the opportunity to demonstrate and apply the understanding and skills that they have developed*
2. Competence in the practical environment
3. Application and development of transferable skills (ICT, team working etc.)
4. A solid foundation in mathematics and physical sciences
5. Subject-specific knowledge
  - *Based on the Benchmark Statements, but with extra if a subject area wants it, e.g. Biochemistry*
6. Developing creativity and enterprise



# Criterion 6

## Developing Creativity and Enterprise

- Enterprise education will develop students' capabilities as “enquiring, critical thinking, future orientated thinkers”
- Students are taught to apply and evaluate original or unconventional ideas, and to tackle problem solving using techniques designed to develop individual and group creativity

*A **contextualised** learning experience using real-world scenarios to gain better alignment with expected key employability skills;*

*The notion and value of intellectual property;*

*The importance of evaluating feasibility and impact through a reflective approach;*

*The interdisciplinary nature of enterprise;*

*Financial literacy in the context of developing commercial awareness*

[https://www.qaa.ac.uk/docs/qaas/enhancement-and-development/enterprise-and-entrepreneurship-education-2018.pdf?sfvrsn=15f1f981\\_8](https://www.qaa.ac.uk/docs/qaas/enhancement-and-development/enterprise-and-entrepreneurship-education-2018.pdf?sfvrsn=15f1f981_8)

# Life and Chemical Sciences (LCS) Skills and Training

Bridging the Skills Gap  
Industrial Biotechnology



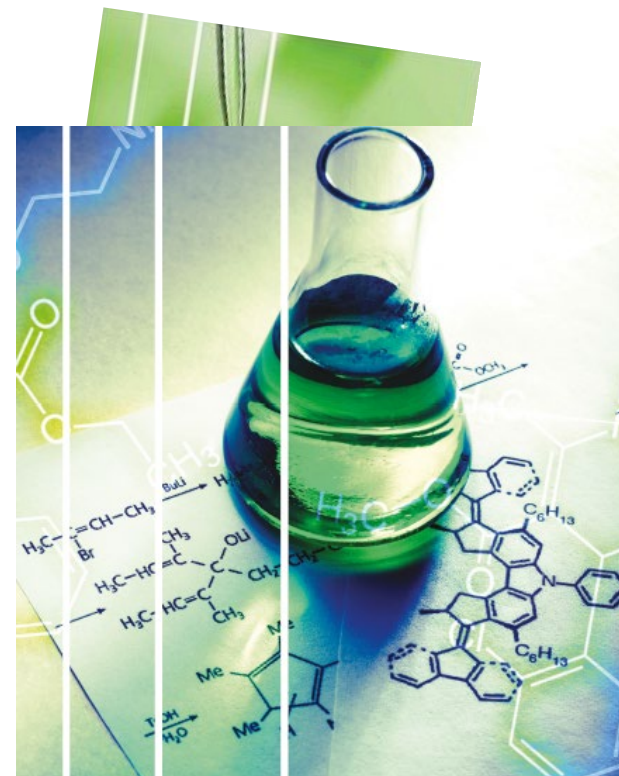
# How does this work in the 'real' world?

- Scotland is looking to further develop it's skills base
  - Skills Development Scotland
  - Scottish Enterprise
  - Scottish Qualifications Authority
  - Education Scotland
- All working together to understand skills shortages, and how to address them at all levels of education
- Expressed through Skills Investment Plans (SIPS), one for each key area
- Joint plan for Life and Chemical Sciences (LCS)
- Owned by industry/employers, supported by education providers



# Life and Chemical Science Skills Investment Plans

- Based on evidence and consultation:
  - Quantitative and qualitative research with numerous businesses
  - Carried out 20+ individual meetings to discuss action plan
  - Tested and endorsed by Skills groups
  - Launched 14<sup>th</sup> May 2018 by Jamie Hepburn MSP



Skills Investment Plan - Executive Summary  
For Scotland's life and chemical sciences



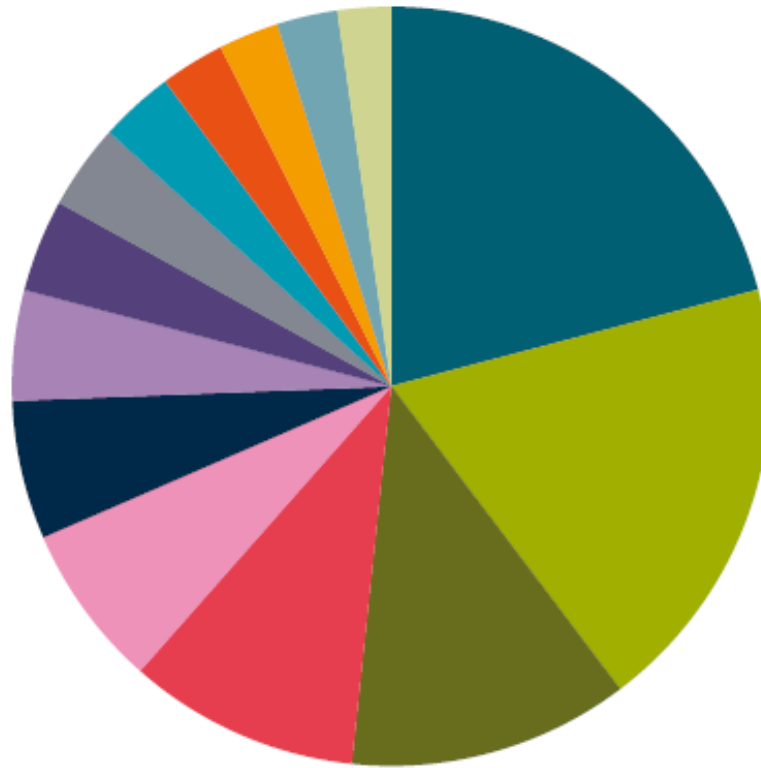




Life Sciences in  
**SCOTLAND**



Chemical Sciences  
**SCOTLAND**



## LCS Sub sectors

- 476 RTD companies across the subsectors

Pharma, Pharma Services and Contract Research 138, 21%	Professional Services 26, 4%
MedTech 124, 19%	Digital Health 24, 4%
Speciality Chemicals 79, 12%	Industrial Biotech 21, 3%
Consumer Chemicals 65, 10%	Commodity Chemicals 18, 3%
AgriTech 46, 7%	Stem Cell and Regenerative 17, 2%
Therapeutics 39, 6%	Bioinformatics and Health Informatics 17, 2%
Other 31, 5%	Materials 15, 2%



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Chemical Sciences  
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# Employment

- **20,300 jobs in the Life Sciences sector** and over **9,200 in the Chemical Sciences sector** in Scotland in 2017.
- **Sector Projections (Demand)**
  - Based on Oxford Economics data, around **900** new CS employees and **2,900** LS employees over the next ten years.
  - Other data from Skills Industry Partnership suggests far greater numbers: 700 to 1,000 (post)graduates and 280 to 600 technicians in combined LSCS sector **every year** for the next ten years\*.
- **MedTech** and **Industrial Biotechnology** are predicted to be the fastest growing subsectors. **1,400 new jobs in IB by 2025.**
- Digital Health saw the fastest growth rate, of 23%, from 2010 to 2015.

*\* Assuming Scotland accounts for 7-10% of the UK workforce in LSCS*



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Chemical Sciences  
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## SIP Priority Objectives

- Address specific skill shortages
- Offer a comprehensive skills and training provision across the country
- Increase exposure to, and basic understanding of, what industry does
- **Enhance basic practical lab experience and the ability to problem solve**



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## Address specific skill shortages

- Engineering and technical skills - maintenance, electrical, mechanical, electronic and process control positions.
- Digital skills - data, software and informatics.
- Regulatory, compliance, QA and QC expertise.
- Business, commercial, and leadership skills allied with sector knowledge.

Multi-disciplinary skills are very important.



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# Enhance basic practical lab experience and the ability to problem solve

- Database of institutions that provide practical lab courses.
- Establish additional courses where necessary.
- Revise and update relevant SVQs to ensure that these meet NOS and accreditation requirements of the sector.
- Adapt HEI provision to include practical classes that address specific industry needs, and where possible **secure accreditation of additional degrees.**



# The numbers

*Scotland has 16 potential providers in the Life Sciences subject area*

Type:	HEIs	Scotland	Programmes
Accreditation	43	6	359/47
Advanced Accreditation	20	1	240/12
Masters Accreditation	1		5
International Accreditation	5		7
International Programme Review	1		1
Foundation Accreditation	1		1
Doctoral Accreditation	2		2





## Impact (*from SDS*)

“All [*accredited University courses*] have **demonstrated substantial changes in their teaching, focusing on laboratory and skills teaching** to address employer concerns over the employability of graduates. Edinburgh Napier University’s introduction of **Good Laboratory Practice** is now a core part of the curriculum and has had a major impact, not only on their programme, but in **sharing their good practice** with other Scottish universities. “

*Life and Chemical Sciences SIP 2018, Skills Development Scotland*



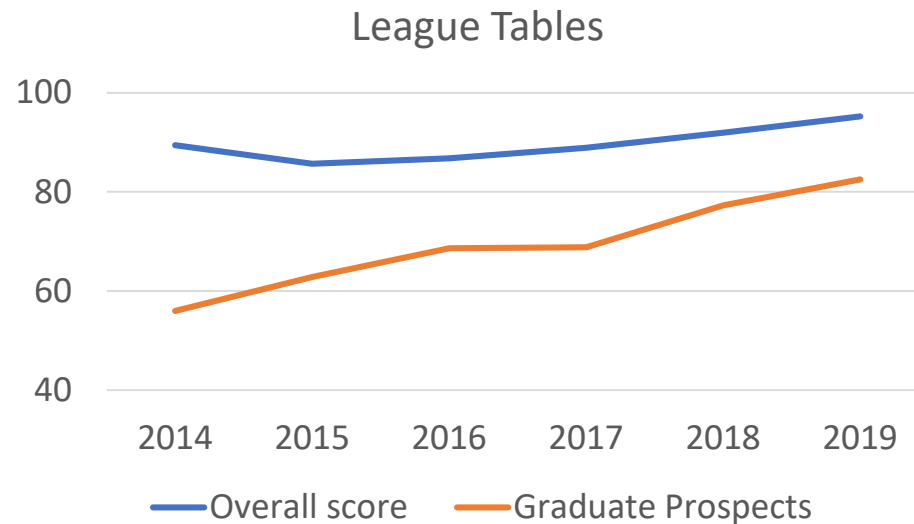
## Impact (*a personal one...*)

### 2013 (old curriculum)

- Destination of Leavers from Higher Education – 64%

### 2016 (new curriculum)

- DHLE – 89%





# University of Dundee



## World Top 250 University

Times Higher Education World University Rankings 2019



## 1 in World

World's most influential research institution in pharmaceuticals  
Clarivate Analytics 2017



## 4th in UK

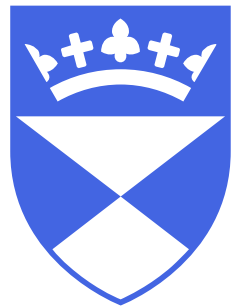
for impact of scientific research  
CWTS Leiden Rankings 2018



## Top 10 in UK

National Student Survey 2017 and 2018





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