PROGRAMME SPECIFICATION	

1	**Awarding Institution**	Newcastle University
2	**Teaching Institution**	Newcastle University
3	**Final Award**	BEng Hons
4	**Programme Title**	Biopharmaceutical Technology Drug Development
5	**UCAS/Programme Code**	F152 Biopharmaceutical Technology F150 Drug Development
6	**Programme Accreditation**	F152 Biopharmaceutical Technology – IChemE
7	**QAA Subject Benchmark(s)**	Engineering
8	**FHEQ Level**	Level 6
9	**Last updated**	May 2010

10 Programme Aims

The aim of the Degree programmes is to produce graduates who have a coherent understanding of biosciences and biochemical/biopharmaceutical engineering, combining a sound theoretical grasp of the subjects with practical experience and an awareness of their responsibilities to society and the environment. Graduates should be capable of becoming professional biopharmaceutical and biochemical engineers and scientists in the bioprocess industry or of following a postgraduate route into a research, industrial or academic career. In order to meet this aim, the Degree programmes have the following objectives:-

1. To recruit good students from a range of geographical, social and academic backgrounds.
2. To produce graduates who have vision and the ability to address the challenges posed by society through the deployment of the skills and knowledge gained during their Degree course.
3. To equip students with a knowledge and understanding of the subject, including the core material specified by the accrediting professional institutions (The Institution of Chemical Engineers and the ISPE)
4. To provide opportunities for students to acquire further knowledge, both in breadth and depth, and to specialise according to their own interests as they develop over the duration of the programme.
5. To enable students to eventually meet the requirements of the accrediting Institutions for Chartered Membership
6. To equip students with appropriate practical skills in biological laboratory experimentation, information processing, data analysis, problem solving, teamwork, and communication skills.
7. To encourage students to develop responsible attitudes towards the needs of society and the environment in the application of their engineering and economic knowledge and to ensure that they have particular regard for the importance of safety in their industrial life.
8. To encourage students to develop appropriate attitudes towards their own future professional development.
9. To provide an environment within the School such that students enjoy the University learning experience sufficiently to want to maintain contact with the School in its future recruiting, teaching, research and social activities.
10. To provide a programme of study which meets the FHEQ Honours level and which also takes account of the subject benchmarks in QAA Engineering and UK-Spec professional standards.

11 Learning Outcomes

The programme provides opportunities for students to develop and demonstrate knowledge and understanding, qualities, skills and other attributes in the biopharmaceutical and biochemical engineering and science areas. The programme outcomes have references to the benchmark statements for Engineering.

Knowledge and Understanding

On completing the programme students should understand:

A1 Background (bio)chemistry, mathematics, biology, pharmacology, cell therapies and drug design that are relevant to biopharmaceutical and biochemical (Bpharm&Bchem) engineering.

A2 The fundamental concepts, principles and theories of (bio)engineering relevant to Bpharm&Bchem engineering.

A3 Business and management techniques, intellectual property and regulatory issues relevant to Bpharm&Bchem engineering.

A4 Detailed knowledge and understanding of the essential facts, concepts, principles and theories of Bpharm&Bchem engineering.

A5 The role of Bpharm&Bchem engineers in society and the constraints within which their judgement will be exercised, including the professional and ethical responsibilities of Bpharm&Bchem engineers.

A6 The environmental and safety issues that affect Bpharm&Bchem engineering and the issues associated with sustainable bioprocessing.

A7 Conceptual, elemental and detailed design of biopharmaceutical / bioprocessing plant.

A8 Safe operation of bioprocesses and bioproduction, including the use of IT for design, control and management.

A9 Codes of practice, design, the assessment of safety and environmental risks, and the legislative framework for safety and regulation of bioindustry.

Teaching and Learning Methods

Knowledge and understanding is primarily imparted through a combination of lectures, tutorials, example classes, case studies, laboratory experiments, coursework and projects in all Stages. In some cases, the formal lectures are supplemented by computer assisted learning (CAL). A number of visiting lecturers and professors from bioindustry and other academic institutions contribute to A3, A6, A7, A8 and A9. Throughout the course, learners are encouraged to undertake independent reading to deepen, supplement and consolidate what is being taught/learnt and to broaden their individual knowledge and understanding of the subject. In the final two years students are given guidance and directed to literature related to their design and case study projects. Feedback on essays, laboratory and project reports allows students to refine their presentation techniques in these areas, and to assess the level of their knowledge and understanding.

Assessment Strategy

Testing the knowledge base is through a combination of unseen written examinations and assessed coursework in the form of laboratory experiment write-ups, coursework reports, project reports and presentations. The proportion of in-course and written examination towards the final module assessment is usually 25 / 75 although this can vary as appropriate for the module and level of study.

Intellectual Skills

On completing the programme students should be able to:

B1 Execute safely a series of experiments and use laboratory equipment to generate data.

B2 Analyse experimental or computational results and determine their strength and validity.

B3 Prepare technical reports, specifications and give technical presentations.

B4 Use the scientific literature effectively and to search for information to develop concepts.

B5 Make engineering sketches and use computational tools and packages.

B6 Produce a conceptual or elemental design to a specification.

B7 Produce a full design specification for a process or process plant.

B8 Identify the required cost, quality, safety, reliability, appearance, fitness for purpose and environmental impact of the application of the design.

B9 Project manage a task.

B10 Determine the criteria for evaluating a design solution and evaluate an outcome of the design against the original specification.

Teaching and Learning Methods

Subject-specific/professional skills are developed through laboratory experiments and project work (B1-B10), design exercises throughout Stages 1, 2, 3 and 4 (B5-B10). Lectures, tutorials, case studies and seminars of specific modules develop skills B5 (Bioprocess Design and all modules that use computer based case studies for assignments), B6-B10 (Project). From the first year, students are required, after appropriate guidance, to search the literature for information and submit all written work in an appropriate scientific and engineering format so that B2-B4 are thoroughly integrated into all submitted work by the final Stage. Students are encouraged to develop appropriate professional and practical skills (B1-B4) by monitored attendance at laboratory sessions during all stages of their studies. From the first year, all written work must be submitted in an appropriate scientific and engineering format and feedback on such work enhances learning of the skills B5-B10 culminating in the Stage 3 design projects. Some projects are carried out in small groups (4-5) and some individually. All are monitored by an academic supervisor and in some cases an industrial supervisor provides additional support.

Assessment Strategy

Practical skills are assessed through laboratory experiment write-ups, coursework and project reports, presentations, group oral discussions, and unseen written examinations. Skills B5-B12 form a major part of the assessment of the Stage 3 design project.

Practical Skills

On completing the programme students should be able to:

C1 Plan, conduct and report a programme of novel investigative work.
C2 Analyse and solve engineering and scientific problems.
C3 Design a process or process plant to meet a need.
C4 Be creative in the solution of problems and in the development of designs.
C5 Evaluate designs and make improvements.
C6 Integrate and evaluate information and data from a variety of sources.
C7 Take a holistic approach to solving problems and designing systems, applying professional judgements to balance risks, costs, benefits, safety, reliability, aesthetics and environmental impact.

Teaching and Learning Methods

Cognitive skills are developed through the teaching and learning programme outlined above. Analysis and problem solving skills are further developed through example classes, tutorials, coursework and project work. Experimental, research and design skills are further developed through coursework activities, laboratory experiments, and case study and design projects. Individual feedback is given to students on all work produced. Students in all years are encouraged, following appropriate guidance, to plan and carry out their investigative work and analyse the experimental data in critical manner. Feedback provided on all submitted work provides opportunities for students to improve their intellectual skills. In particular, project work provides the opportunity to develop skills C1-C7.

Assessment Strategy

Analysis and problem solving skills are assessed through unseen written examinations and coursework. Experimental, research and design skills are assessed through laboratory experiment write-ups, coursework reports and project reports, presentations and unseen written examinations. Creative and design skills are assessed through design project reports and design presentation.

Transferable/Key Skills

On completing the programme students should be able to:

D1 Communicate effectively (orally and in writing).
D2 Apply mathematical skills through modelling and analysis.
D3 Work as a member of a team (an interdisciplinary team where appropriate).
D4 Develop ideas and solutions to engineering and scientific problems.
D5 Use information and communications technology.
D6 Manage resources and time, plan, organise and prioritise work effectively to meet deadlines.
D7 Learn independently in familiar and unfamiliar situations with open-mindedness and in the spirit of critical enquiry.
D8 Learn effectively for the purpose of continuing professional development and in a wider context throughout their career.

Teaching and Learning Methods

Transferable skills are developed through the teaching and learning programme outlined above. Basic communication skills D1 will acquired through individual and team projects throughout a number of modules and the design projects in each Stage. These are then developed through feedback on written reports and presentations made as part of coursework assignments. Skills D1-D3 will be developed in subject-specific modules and the students obtain feedback to enhance their learning as parts of those modules. Students will be required to find information and give oral and/or written presentations throughout all years of study. Deadlines for submission of coursework are enforced, encouraging students to develop D6 and this is supported by guidance provided during Induction week at each Stage of the programme. Design problems at each stage provide an opportunity to develop skills D3-D8.

Assessment Strategy

Transferable and communication skills are assessed through coursework reports, presentations and oral examinations in a number of compulsory and optional modules throughout all stages. The assessment of Stage 3 major project includes assessment of key skills.

12 Programme Curriculum, Structure and Features

Basic structure of the programme

The Undergraduate year is 31 weeks, arranged in three terms and currently divided into two Semesters and include an Induction week at the beginning of Semester 1.

The programme normally lasts three years. Every Honours student studies 120 credits in each Stage, resulting in BEng candidates completing 360 credits. Progression from Stage 1 to Stage 2 depends upon student achieving at least a 40% overall Stage average. Limited compensation of marks of at least 35% is permitted for non-core module. Further details are contained in the University Examination Conventions.

Key features of the programme (including what makes the programme distinctive)

Particular features of the programme are:

- High content of laboratory-based practical work
- High content of design-based work in teams and individually
- High industrial relevance with significant industrial input particularly in Stage 3.

Programme regulations (link to on-line version)

http://www.ncl.ac.uk/regulations/programme/

13 Criteria for admission

Entry qualifications

All applicants are considered individually on the basis of past academic performance and potential for achievement. We normally require a mathematics and biology A-level with a suitable third subject. For BEng, we normally ask for a BBB performance for direct entry to Stage 1. We ask for BCC for intending BEng students with 'A' level subjects not matching the requirements who will progress to the Faculty Foundation Year.

Students who enter on the BEng stream may transfer to the MEng stream at the end of Stage 2 if they achieve an overall stage average equivalent to a 2:1 standard at first attempt.

Admissions policy/selection tools

We will use PAOD interviews as part of the selection process, which take into account contextual factors which may affect the academic performance of individual applicants (such as attending a poorly performing School etc).

Non-standard Entry Requirements

Students are eligible to enter directly into the 2nd year of the degree programme if they hold diplomas in Chemical Engineering with suitable grades. Typically, we look for a final average of 60% or equivalent. Even then, all applications are considered on an individual basis, to ensure that the applicant has the necessary background to successfully complete Stage 2. Otherwise, the applicant will be offered entry into Stage 1.

Additional Requirements

Level of English Language capability
IELTS 6.5 (or equivalent)

14 Support for Student Learning

The Student Services portal provides links to key services and other information and is available at: *http://www.ncl.ac.uk/students/*

Induction
During the first week of the first semester students attend an induction programme. New students will be given a general introduction to University life and the University's principle support services and general information about the School and their programme, as described in the Degree Programme Handbook. New and continuing students will be given detailed programme information and the timetable of lectures/practicals/labs/ tutorials/etc. The International Office offers an additional induction programme for overseas students.

Study skills support
Students will learn a range of Personal Transferable Skills, including Study Skills, as outlined in the Programme Specification. Some of this material, e.g. time management is covered in the appropriate Induction Programme. Students are explicitly tutored on their approach to both group and individual projects.

Numeracy support is available through Maths Aid and help with academic writing is available from the Writing Centre (further information is available from the Robinson Library).

Academic support
The initial point of contact for a student is with a lecturer or module leader, or their tutor (see below) for more generic issues. Thereafter the Degree Programme Director or Head of School may be consulted. Issues relating to the programme may be raised at the Staff-Student Committee, and/or at the Board of Studies.

Pastoral support
All students are assigned a personal tutor whose responsibility is to monitor the academic performance and overall well-being of their tutees. In addition the University offers a range of support services, including one-to-one counselling and guidance or group sessions / workshops on a range of topics, such as emotional issues e.g. Stress and anxiety, student finance and budgeting, disability matters etc. There is specialist support available for students with dyslexia and mental health issues. Furthermore, the Union Society operates a Student Advice Centre, which can provide advocacy and support to students on a range of topics including housing, debt, legal issues etc.

Support for students with disabilities
The University's Disability Support Service provides help and advice for disabled students at the University - and those thinking of coming to Newcastle. It provides individuals with: advice about the University's facilities, services and the accessibility of campus; details about the technical support available; guidance in study skills and advice on financial support arrangements; a resources room with equipment and software to assist students in their studies.

Learning resources
The University's main learning resources are provided by the Robinson and Walton Libraries (for books, journals, online resources), and Information Systems and Services, which supports campus-wide computing facilities.

All new students whose first language is not English are required to take an English Language Proficiency Test. This is administered by INTO Newcastle University Centre on behalf of Newcastle University. Where appropriate, in-sessional language training can be

provided. The INTO Newcastle University Centre houses a range of resources which may be particularly appropriate for those interested in an Erasmus exchange.

15 Methods for evaluating and improving the quality and standards of teaching and learning

Module reviews
All modules are subject to review by questionnaires which are considered by the Board of Studies. Changes to, or the introduction of new, modules are considered at the Board of Studies and/or the School Teaching and Learning Committee. Student opinion is sought at the Staff-Student Committee and/or the Board of Studies. New modules and major changes to existing modules are subject to approval by the Faculty Teaching and Learning Committee.

Programme reviews
The Board of Studies conducts an Annual Monitoring and Review of the degree programme and reports to Faculty Teaching and Learning Committee. The FTLC takes an overview of all programmes within the Faculty and reports any Faculty or institutional issues to the University Teaching and Learning Committee.

External Examiner reports
External Examiner reports are considered by the Board of Studies. The Board responds to these reports through Faculty Teaching and Learning Committee. External Examiner reports are shared with institutional student representatives, through the Staff-Student Committee.

Student evaluations
All modules, and the degree programme, are subject to review by student questionnaires. Informal student evaluation is also obtained at the Staff-Student Committee, and the Board of Studies. The National Student Survey is sent out every year to final-year undergraduate students, and consists of a set of questions seeking students' views on the quality of the learning and teaching. The results from student surveys are considered as part of the Annual Monitoring and Review of the programme and any arising actions are captured at programme and School / institutional level and reported to the appropriate body.

Mechanisms for gaining student feedback
Feedback is channelled via the Staff-Student Committee and the Board of Studies.

Faculty and University Review Mechanisms
The programme is subject to the University's Internal Subject Review process. Every five years degree programmes in each subject area are subject to periodic review. This involves both the detailed consideration of a range of documentation, and a two-day review visit by a review team which includes an external subject specialist in addition to University and Faculty representatives. Following the review a report is produced, which forms the basis for a decision by University Teaching and Learning Committee on whether the programmes reviewed should be re-approved for a further five year period.

Accreditation reports

Additional mechanisms
All staff are subject to periodic peer observation of their teaching. Any issues arising are dealt with by the School Teaching & Learning Committee.

16 Regulation of assessment

Pass mark
The pass mark is 40%

Course requirements
Progression is subject to the University's Undergraduate Progress Regulations and Undergraduate Examination Conventions. In summary, students must pass, or be deemed to

have passed, 120 credits at each Stage. Limited compensation up to 40 credits and down to a mark of 35% is possible at each Stage and there are re-assessment opportunities, with certain restrictions.

Weighting of stages
The marks from **Stages 2 and 3** will contribute to the final classification of the degree
The weighting of marks contributing to the degree for **Stages 2 : 3 is *1 : 2.***

Common Marking Scheme
The University employs a common marking scheme, which is specified in the Undergraduate Examination Conventions, namely

	Modules used for degree classification (DC)	**Modules not used for degree classification**
<40	Fail	Failing
40-49	Third Class	Basic
50-59	Second Class, Second Division	Good
60-69	Second Class, First Division	Very Good
70+	First Class	Excellent

Role of the External Examiner
An External Examiner, a distinguished member of the subject community, is appointed by Faculty Teaching and Learning Committee, following recommendation from the Board of Studies. The External Examiner is expected to:

i. See and approve assessment papers
ii. Moderate examination and coursework marking
iii. Attend the Board of Examiners
iv. Report to the University on the standards of the programme

In addition, information relating to the programme is provided in:

The University Prospectus: http://www.ncl.ac.uk/undergraduate/

The School Brochure (email: enquiries@ncl.ac.uk)

Degree Programme and University Regulations: http://www.ncl.ac.uk/regulations/docs/

The Degree Programme Handbook

Please note. This specification provides a concise summary of the main features of the programme and of the learning outcomes that a typical student might reasonably be expected to achieve if she/he takes full advantage of the learning opportunities provided. The accuracy of the information contained is reviewed by the University and may be checked by the Quality Assurance Agency for Higher Education.

Annex

Mapping of Intended Learning Outcomes onto Curriculum/Modules

1. Common modules

		Intended Learning Outcomes			
Module	**Type**	**A**	**B**	**C**	**D**
ACE1013	Compulsory	1,	2,3,4	1,6	1,4,5
BIO1019	Compulsory	1	1,2,3,4	1,2	1,4
BIO1001	Compulsory	1	1,2,3,4	1,2,6	1,4,5
BIO1004	Compulsory	1	1,2,3,4	1,2	1,4
CHY1101	Compulsory	1	1,2,3,4	1,2	1,4
CME1050	Compulsory	1,2	2,3,5	2	1,2,4,5
CME1051	Compulsory	2	5	2	1,2,4
CME1023	Compulsory	2	3,4	2	1,2,4
ACE2034	Compulsory	2,4	1,2,3,4	1,2,6	1,3,4,5
BIO2010	Compulsory	2,4	1,2,3,4,5	1,2,6	1,2,4,5
BIO2015	Compulsory	2,3,4,5	1,2,3,4	1,2,6	1,2,4,5
CME2050	Compulsory	2,4,6	2,3,4	2,4,6	1,2,4,5
CHY2103	Compulsory	2,4	4	2	1,4
CME2051	Compulsory	2,4,5	2,3,4,5,6	2,3,4	1,2,4,5,7
CME2052	Compulsory	2,4	2,3,4,5,6	2,3,4	1,2,4,5,7
CME2054	Compulsory	2,4	2,3,4	2	1,2,3,4,5,7
CME2055	Compulsory	2,3,4,5,6,7,8,9	2,3,4,5,6,7,8,9,10	2,3,4,6	1,2,3,4,5,6,7,8
CME2053	Compulsory	2,4	3,4	2	1,2,4,5
BIO3015	Compulsory	2,5,6	3,4	4	1,3,4,5
BIO3029	Compulsory	2,4	2,3,4,5	2	1,2,45
CME3050	Compulsory	2,3,4,5,5,6,7,9	2,3,4,5,6,9	1,2,4,6	1,2,3,4,5,6,7,8
CME3051	Compulsory	2,3,4,5,5,6,7,8,9	2,3,4,5,6,7,8,9,10	1,2,3,4,5,6,7	1,2,3,4,5,6,7,8

2a. For **F152 Biopharmaceutical Technology** the additional also apply:

		Intended Learning Outcomes			
Module	**Type**	**A**	**B**	**C**	**D**
CME2016	Compulsory	2,4,8,9	1,2,3,4,5,6	2,4,6,7	1,2,4,5,6,7
CME3056	Compulsory	2,4,7,8,9	2,3,4,5,6,7	2,3,4,5,6	1,2,4,5,7
CME3057	Compulsory	2,4,7,8,9	2,3,4,5,6,7	2,3,4,5,6	1,2,4,5,7
CME3058	Compulsory	2,4,7,8,9	2,3,4,5,6,7	2,3,4,5,6	1,2,4,5,7
CME3059	Compulsory	2,4	2,3,4	1,2,4,6	1,2,3,4,5,6,7

2b. For **F150 Drug Development** the additional also apply:

		Intended Learning Outcomes			
Module	**Type**	**A**	**B**	**C**	**D**
BIO3030	Compulsory	2,4	1,2,3,4	1,2,4,6	1,3,4,5
CHY3103	Compulsory	2,4	4	2,6	1,4,5,7
CME3052	Compulsory	2,4	2,3,4	1,2,4,6	1,2,3,4,5,6
CME3053	Compulsory	2,4,5,6	3,4	2,4,6	1,3,4,5,7
CME3054	Compulsory	2,4	2,3,4	1,2,4,6	1,2,3,4,5,6,7