UNIVERSITY OF KENT

Applied Bioscience Technology Foundation Degree
Please note: This specification provides a concise summary of the main features of the programme and the learning outcomes that a typical student might reasonably be expected to achieve and demonstrate if he/she passes the programme. The accuracy of the information contained in this specification is reviewed by the University and may be checked by the Quality Assurance Agency for Higher Education. The development of this Foundation Degree (Fd) has arisen from an evaluation of industry requirements under the HEFCE funded Working Higher initiative. A consortium of five HEI partners are working together to create a Foundation Degree Framework covering the bioscience, chemical, nuclear, polymer and refining & petrochemical industries. Kent is responsible for leading the Fd development for the biosciences sector. The Applied Bioscience Technology Fd has thus been developed in close consultation with employers and utilising the engagement of a 0.5 FTE Industry Champion over two years. This will be a three year part-time programme with a heavy emphasis on work-based learning with the vast majority of knowledge based materials being delivered through an e-learning platform.

Educational Aims of the Programme These are related to the subject benchmarking statement for Biosciences as well as the generic aims highlighted by the Foundation Degree benchmark. **The programme aims to:**
1. Instil in students a sense of enthusiasm for learning which may lead to continuing professional development or pathways for lifelong learning. 2. Produce graduates equipped with the skills to play an enhanced role in the Biosciences Industry, nationally. 3. Educate students in the theoretical (subject specific knowledge) and practical (laboratory based) aspects of the biological sciences which relate to current and future employment needs. 4. Provide students with the skills to adapt and respond positively to new developments in the workplace. 5. Develop the critical, analytical, problem based learning skills required by the students in the workplace. 6. Develop student's competences in a broad range of areas relevant to their current and future employment. 7. Enhance and develop the student's interpersonal skills.

Programme Structures and Requirements, Levels, Modules, Credits and Awards
The programme will be studied over three years part time. It will comprise 120 credits at Level 4 (Certificate level) and 120 credits at Level 5 (Intermediate level). Each year consists of modules (see below) which all have specified learning outcomes and each module carries a specific number of credits. One credit corresponds to approximately 10 hours of "learning time" and one 15 credit module therefore represents approximately 150 hours of learning endeavour and assessment. These hours include all directed e-learning, appropriate work based learning and all private study time. It is anticipated that students will already have or will be able to attain some of the laboratory/industry skills in the work place and systems will ensure that this can be recognised as Accredited Prior (Experiential) Learning (AP(E)L). Where these skills can't be covered in the work place then it is the intention to provide these through a short residential summer school at Kent University. Students must achieve the specified learning outcomes associated with a module in order to gain the credits. The structure of the programme and the modules which make it up, including their levels and credits, as well as the year of delivery are shown below and also in a diagram in Appendix 1.

Online e-learning is intended to present the key information directly relating to the learning objectives.
E-activities, practicals and work activities serve to reinforce material presented online and also relate directly to the learning objectives. These are specifically based on enabling students to relate their theoretical knowledge of Cell Biology to the bioscience workplace in a variety of industries.
MSCL serves to reinforce and support materials presented in the above forms in the students' minds. They also form part of the self-directed learning for the student.
Private study encompasses the revising of all material presented in the above various forms of teaching and learning, together with the opportunity to explore and read more widely around specific topics (this may already have been suggested in the MSCL materials).

The programme will be delivered using Moodle as a Virtual Learning Environment (VLE) and myFolio will be used to hold all Reflective Portfolio entries and Personal Development Plans.

Module List			
Level 4 modules			
Cell Biology (K)	Core	Year 1	15 credits
Biochemistry (K)	Core	Year 1	15 credits
Microbiology (K)	Core	Year 1	15 credits
Applied Chemistry (K)	Core	Year 1	15 credits
Basic Laboratory/Industry skills (C)	Core	Year 1	15 credits
Business Improvement (C)	Core	Year1/2	15 credits
Human Physiology & Disease (K)	Core	Year 2	15 credits
Metabolism and Enzymology (K)	Core	Year 2	15 credits
Level 5 modules *(Choose 2 science based options and one business based option)*			
Advanced Laboratory/Industry skills (C)	Core	Year 2	15 credits
GxP (C)	Business option	Year 2	15 credits
Technology Transfer (C)	Business option	Year 2	15 credits
Company based Project (C)	Core	Year 2/3	60 credits
Infection & Immunity (K)	Science option	Year 3	15 credits
Applied Microbiology (K)	Science option	Year 3	15 credits

(K) = Knowledge module (C) = Competence module

Work-Based Learning

The character of this Foundation degree is based on the integration of employer involvement together with flexible delivery, having work-based learning at the core of the programme. Work based activities are embedded in the e-learning materials used to deliver the knowledge in the science based modules. There is a core business improvement module together with an optional business module on a topic relevant to the business or work place. The programme also has a significant work-based project which will ideally provide business improvement(s) for the relevant company.

Roles and Responsibilities

The contributions to be made in managing learning and especially work-based learning within the Foundation Degree programme will require that the roles and responsibilities of learner, programme leader, tutor, mentor and supervisor are clearly defined and that appropriate systems and schedules are in place. This section offers some introductory guidance and it is anticipated that meetings with all involved will take place when learners register on the programme. Training and support will be provided for supervisors and mentors.

Learners
Learners will engage in the learning and assessment as detailed in the programme and module specifications. Various delivery and assessment processes will be involved across the modules in the programme. The learner may be best served if a Learning Agreement is negotiated between the provider and employer with the active involvement of the learner. The learner will both collect evidence which demonstrates the tasks achieved and will create reflective statements in a portfolio demonstrating what learning has been achieved as a result of the tasks.

Programme Leaders
Programme leaders will be responsible for a general oversight of the allocation of tutors, as well as working with supervisors and mentors for each learner. This will include ensuring that adequate staff development takes place and that in each case the scheduled activities are taking place on time and achievements are to the standards required.

Tutors
Tutors have a key role in the management and operation of the learning for each of the learners. Responsibilities will be many and varied, but will include:

- Accreditation of prior learning (whether through experience or formal education)
- Accreditation of an employer's staff development provision
- Identification of the working opportunities which will facilitate achievement of Learning

Outcomes(LOs)
- Identification of the evidence required to demonstrate the achievement of a LO
- Providing an opportunity for formative assessment within a module
- Setting and marking the formal assessment within a module
- Pastoral responsibility for the learner
- Negotiation with supervisors, mentors and learners as the circumstances of the work environment change

Supervisor
The supervisor in the work place must negotiate with the programme leader and tutor in order to identify work which will provide the opportunity needed for a learner to achieve and evidence the learning outcomes of the qualification. The supervisor also has the key responsibility to ensure that this identified work is allocated to a learner with an adequate time allocation. The supervisor must review the progress and attainments of each learner with the tutor concerned and undertake management actions in order to redress any problems or obstacles.

Mentor
The mentor in the work place is charged with a number of roles which are supportive in nature and not in any way judgemental. A mentor would typically be someone working at a more senior level than the learner with greater experience of most of the tasks of the job role. The mentor would provide a sounding board for the learner as the challenges of the job become more demanding. Providing informal guidance as the learner develops the improved capability needed to handle these greater challenges. The mentor would advise on the use of resources and give informal feedback on the standards being achieved. Smaller companies may be limited in their scope to resource this role. As an alternative, a learner's mentor might be someone in another business with whom he or she is engaged in a project, rather than someone in her/his own company.

Module outlines

Practicals will underpin the topics and students will be expected to work independently and reflect on their own and others results, their relationship to laboratory technicians in the work place and their own professional development. All practicals will be recorded at GLP standard, written up and critically analysed. Below are listed examples of some practicals which will be included as part of the programme of study. These will be undertaken where possible in the workplace or during the summer school held at the University of Kent. Each student will undergo a review upon commencement of the course to avoid unnecessary duplication of their existing skills base and to identify gaps in knowledge and competences.

Cell Biology (Knowledge Module)

Synopsis of the Curriculum
- Prokaryotic and Eukaryotic cells: a visual comparison.
- Biological macromolecules
- Cellular organelles: structure and function
- Cellular organelles that transfer energy
- Intercellular contacts and communication
- Cells to systems
- Cell division cycle
- Cytoskeleton
- Biotechnology and cell culture - Discussing the different applications of biotechnology

Specific learning outcomes:
- An understanding of Prokaryotic and Eukaryotic cell classes. Focusing on structural similarities and differences
- An understanding of cellular organelles and their role within cells
- A knowledge of cellular transport and communication mechanisms
- An understanding of the processes involved in cell division and specialisation of cells into specific tissues
- An understanding of the importance of cell culture in the Biotechnology industry

Generic learning outcomes:
- The development of practical/technical skills
- An ability to analyse, evaluate and correctly interpret data

- An ability to present and communicate data
- An ability to obtain and use information from a variety of sources as part of self-directed learning
- Time-management and organisational skills within the context of self-directed learning

Assessment

- Reflective report/case study/lab report, my Folio entry, MCQ, 1 hour examination.

Work-based learning

- 30% of this module will be carried out in the workplace

Biochemistry (Knowledge Module)

Synopsis of curriculum:

- Protein Biochemistry
- Amino acids: levels of the protein structural organisation; Primary, secondary, tertiary and quaternary structure of proteins
- Basic description of the protein biological functions and practical applications of protein Biochemistry (Medicine, Biomedicine and Biotechnology).
- Enzymes as biological catalysers: their structure function and classification.
- Principles of enzyme technology and using enzymes as drug targets.
- Biochemistry of the nucleic acids, purine and pyrimidine nucleotides.
- Structural organisation of different types of nucleic acids (DNA and RNAs).
- Basic description of the nucleic acid biological functions.
- Practical applications of the nucleic acid Biochemistry (Plasmids, Biotechnology, Bioreactors).
- Biochemistry of carbohydrates: structural organisation of monosaccharides, disaccharides, oligosaccharides and polysaccharides.
- Basic description of the carbohydrate biological functions and practical applications of the carbohydrate biochemistry (Medicine, Biomedicine and Biotechnology).
- Biochemistry and classification of lipids: structural organisation and functions of triacylglycerols, phospholipids, sphingolipids, cardiolipins and steroids.
- Biological membranes as a classic example of static interaction of biologically active compounds. Principles of integration of lipids, proteins, enzymes and carbohydrates associated with nucleic acid functioning.

Specific learning outcomes:

- An understanding of the principles of the protein structure/folding and an ability to explain their functions in general
- A knowledge of the principles of static enzyme Biochemistry, enzyme classification and basic principles of enzyme functioning
- Demonstrate a knowledge of basic principles of the nucleic acid structure with an ability to explain their disparate cellular roles and practical applications of this knowledge
- Demonstrate a knowledge of the principles of carbohydrate Biochemistry and explain the biological functions of the carbohydrates
- A knowledge of the principles of lipid classification, structure and functions
- Understand basic mechanisms of static integration of biologically active compounds into biological membranes
- An ability to link this knowledge to everyday activities in the bioscience workplace

Generic learning outcomes:

- The development of practical laboratory-based skills
- An ability to analyse, evaluate and correctly interpret data
- An ability to present and communicate data
- An ability to obtain and use information from a variety of sources as part of self-directed learning
- Time-management and organisational skills within the context of self-directed learning

Assessment

- Reflective report/case study/lab report, my Folio entry, MCQ, 1 hour examination.

Work-based learning

- 30% of this module will be carried out in the workplace

Microbiology (Knowledge Module)

Synopsis of the curriculum:

- Microbial diversity and classification
- Safe handling of microbes
- Structure and function of micro-organisms
- Collection and storage of working culture collections
- Observing microbes: microscopy and culture
- Isolation and identification of micro-organisms
- Microbial growth dynamics

Specific learning outcomes:

- The ability to describe the diversity and classification of micro-organisms
- An understanding and appreciation of the role of Health & Safety and Risk Assessment in the working microbiological environment
- An appreciation of the basics of microbial structure and function
- An ability to perform a range of basic microbiological techniques
- The ability to isolate and identify bacteria (to species level) using appropriate culture and diagnostic techniques

General learning outcomes:

- The development of practical laboratory-based skills
- An ability to analyse, evaluate and correctly interpret data
- An ability to present and communicate data
- An ability to obtain and use information from a variety of sources as part of self-directed learning
- Time-management and organisational skills within the context of self-directed learning

Assessment

- Reflective report/case study/lab report, my Folio entry, MCQ, 1 hour examination.

Work-based learning

- 30% of this module will be carried out in the workplace

Applied Chemistry (Knowledge Module)

Synopsis of the curriculum:

- Atomic structure, bonding and molecular structure
- Introduction to mechanistic principles
- Organic functional groups and their physicochemical properties
- Drug stereochemistry
- Ions in solution
- Physicochemical properties of drugs in solution
- Buffers, acids and bases
- COSHH in the work place

Specific learning outcomes:

- Demonstrate a basic understanding of atomic structure, bonding and basic understanding of reaction mechanisms
- Demonstrate an understanding of the physicochemical properties of major organic functional groups and the concept of aromaticity
- Develop an understanding of stereochemistry and an ability to apply the principles of chirality to the activity and metabolism of drugs
- Knowledge and understanding of selected theories and applications of chemistry such as ions in solution, acids, bases and buffers

Generic learning outcomes:

- The development of practical laboratory-based skills

- An ability to analyse, evaluate and correctly interpret data
- An ability to present and communicate data
- An ability to obtain and use information from a variety of sources as part of self-directed learning
- Time-management and organisational skills within the context of self-directed learning

Assessment

- Reflective report/case study/lab report, my Folio entry, MCQ, 1 hour examination.

Work-based learning

- 30% of this module will be carried out in the workplace

Human Physiology & Disease (Knowledge Module)

Synopsis of the curriculum:

- Basic structure and function of the human body
- The physiology of the normal, healthy body
- The physiology of disease
- Detailed diagnosis, prognosis and treatment of a defined disease condition

Specific learning outcomes:

- An ability to describe the structure and function of major body systems and organs
- An ability to describe the normal physiology and function of a range of specialised cells and how these function
- An ability to explain how humans are able to assimilate nutrients and remove waste products
- An appreciative understanding of major diseases that affect the body's cells, tissues and organs

Generic learning outcomes:

- The development of practical laboratory-based skills
- An ability to analyse, evaluate and correctly interpret data
- An ability to present and communicate data
- An ability to obtain and use information from a variety of sources as part of self-directed learning
- Time-management and organisational skills within the context of self-directed learning

Assessment

- Case study, my Folio entry, MCQ, 1 hour examination.

Work-based learning

- 30% of this module will be carried out in the workplace

Basic Laboratory/Industry Skills (Competence Module)

Synopsis of the curriculum:

- Health and safety in the workplace and relevant legislation.
- Basic science skills such as GLP, keeping a laboratory notebook, making and recording measurements, identifying sources of error.
- SI units, concentration (molarities), dilutions.
- Preparation and use of buffers. Definition of pH and its relevance in biological systems. Acids and bases together with titrations.
- Use of a range of standard equipment found in the bioscience sector.
- Generation and presentation of data (tables and graphs), together with writing laboratory reports.
- The application of Scientific Method.
- Use of mathematical calculations and statistics in planning and analysis of experiments.

Specific learning outcomes:

- Have an appreciation of the importance of Health and Safety in the laboratory
- Demonstrate a range of fundamental laboratory/industry skills with an aptitude to develop others in the future
- The ability to use scientific method to test an hypothesis or theory

- The ability to generate, evaluate, interpret and present practical work
- Show an understanding of the role of the laboratory technician/process operator in industry

Generic learning outcomes:

- The development of practical laboratory/industry based skills
- An ability to analyse, evaluate and correctly interpret data
- An ability to present and communicate data
- An ability to obtain and use information from a variety of sources as part of self-directed learning
- Time-management and organisational skills within the context of self-directed learning

Assessment:

- Production of a new SOP, together with a short report on the generation of a limited data set and 1 hour practical examination

Work-based learning

- 65% of this module will be carried out in the workplace

Business Improvement Techniques (Competence Module)

As organisations strive to remain globally competitive, continuous improvement within the sector is a necessity and those employees that are skilled in applying the relevant concepts and techniques are very much in demand. Many organisations have created unique roles (e.g. Continuous Improvement Practitioner, Lean Six Sigma Practitioner) dedicated to tackling problems and implementing continuous change processes.

The aim of this module is to provide the student with the capability to lead continuous improvement projects and apply continuous improvement processes to work place problems. The module is a combination of academic study and work based learning. The module initially introduces the basic concepts associated with continuous improvement and provides examples of improvement cycles, methodologies and tools. The student then selects examples of these and puts them into practice through a "bite size" work based project that can be completed in a three month time span. The course is deliberately structured to encourage the student to apply the continuous improvement techniques studied to a real work based problem and reflect upon and consider their impact.
On completion of the module students could be designated as Lean Six Sigma green belts.

Synopsis of the curriculum:

- An overview of the continuous improvement process illustrating how it is being applied throughout the bioscience industries
- Building and leading effective teams
- Project management in the work place
- Business improvement process cycles – PDCA (Plan, Do, Check, Act) and the progression to DMAIC (Define, Measure, Analyse, Improve, Control). DMAIC will then be used as the cycle to deploy the methodologies and tools.
- Methodologies: - Lean (reduction of "waste" in all its forms and productivity improvement); - Six Sigma (reduction in process variation and elimination of errors)
- Continuous Improvement Reporting – the Toyota A3 Report

Specific learning outcomes:

- Demonstrate a working knowledge of project management and an ability to relate this to the current work environment
- Demonstrate a clear understanding of the various continuous improvement cycles, methodologies and tools that are commonly employed in a process plant, laboratory or office business context
- Demonstrate the capability and confidence to apply a project management **or** continuous improvement process to a real work based situation
- Show the ability to critically self appraise the application and impact of the project management **or** continuous improvement process project and to identify its' strengths and weaknesses
- Have the ability to clearly communicate the findings through a report and presentation to a varied target audience

Generic learning outcomes:

- The development of project management skills
- An ability to analyse, evaluate and correctly interpret data
- An ability to present and communicate data

Assessment:

- Work-based report and presentation

Work-based learning

- 60% of this module will be carried out in the workplace

Metabolism & Enzymology (Knowledge Module)

Synopsis of the curriculum:

- The characteristics of enzymes as biological catalysts, enzyme kinetics, enzyme classification
- The role of nucleic acids in synthesis of macromolecules, particularly proteins and enzymes
- Regulation of enzyme activity
- Anabolic and catabolic metabolic pathways
- Roles of ATP/NAD+/FAD
- Aerobic respiration, oxidative phosphorylation
- Products of glycolysis catabolism, anabolic formation of glucose, role of glycogen its formation and breakdown
- Fat metabolism and fat as an energy store
- Photosynthesis and its role in uptake of carbon dioxide and primary production of carbohydrate
- Human metabolic diseases related to altered amino acid metabolism and protein structure
- Enzyme/drug interactions

Specific learning outcomes:

- Have the ability to describe basic metabolic pathways (anabolic and catabolic)
- Have a knowledge and understanding of the role of energy conversions in cell metabolism
- Appreciate the role of nucleic acids and the genetic code in the synthesis of macromolecules
- Have the ability to discuss human metabolic disorders related to altered amino acid metabolism
- Have a knowledge and understanding of drug-enzyme interactions
- An ability to link the above knowledge to everyday activities in the bioscience workplace

Generic learning outcomes:

- The development of practical laboratory-based skills: such as the ability to undertake experiments in enzyme kinetics
- An ability to analyse, evaluate and correctly interpret data
- An ability to present and communicate data
- An ability to obtain and use information from a variety of sources as part of self-directed learning
- Time-management and organisational skills within the context of self-directed learning

Assessment

- Reflective report/case study/lab report, myFolio entry, MCQ, 1 hour examination.

Work-based learning

- 30% of this module will be carried out in the workplace

Infection & Immunity (Knowledge Module)

Synopsis of the curriculum:

- The major micro-organisms responsible for infectious disease in humans
- Routes of entry and host defences
- Pathogenicity and modes of transmission
- The role of the immune system: Defence of the realm
- The components and function of the immune system – humoral and cell mediated immunity;

innate and acquired immunity, antibody-antigen interactions
- Immunisation and vaccination programmes as modern Public Health control measures
- When things go wrong: allergy, autoimmunity, immunodeficiency and transplant rejection

Specific learning outcomes:
- Demonstrate an understanding of the nature of infectious diseases, their transmission and spread
- Develop an understanding of the elements of the immune system in terms of the body's response to infection
- Have an appreciation of the consequences of immune responses
- Demonstrate an understanding of the methods used to manipulate the immune response: and appreciate the role of immunisation and vaccination programmes

Generic learning outcomes:
- An ability to analyse, evaluate and correctly interpret data
- An ability to present and communicate data
- An ability to obtain and use information from a variety of sources as part of self-directed learning
- Time-management and organisational skills within the context of self-directed learning

Assessment
- Case study, my Folio entry, MCQ, 1 hour examination

Work-based learning
- 20% of this module will be carried out in the workplace

Applied Microbiology (Knowledge Module)

Synopsis of the curriculum:
- Safe laboratory practice: legislation relating to Health & Safety and the handling of dangerous pathogens
- Techniques available for the measuring of microbial growth
- The control of microbial growth: disinfection, sterilisation and the basics of antibiotic use
- Microbial metabolism
- Microbiology and the environment: waste & sewage
- Microbiology and medicine: infectious diseases
- Microbiology and industrial production: pharmaceuticals & health, modern biotechnology, foods & beverages

Specific learning outcomes:
- Demonstrate a working knowledge of aseptic technique, containment of pathogens and use of sterile areas in industrial processes
- An ability to evaluate the methods available for control of microbial contamination
- Demonstrate both a practical understanding and working knowledge of GLP and GMP
- The ability to describe a range of industrial applications of microbiology
- Demonstrate an in-depth knowledge of ONE specified case within industrial microbiology

Generic learning outcomes:
- An ability to obtain and use information from a variety of sources to develop research skills
- An ability to develop problem solving skills
- An ability to synthesise and present data
- Show time-management and active learning skills together with the use of a reflective personal development plan within the context of self-directed learning
- An ability to broaden knowledge beyond one's own immediate experience within a field

Assessment
- Reflective report/case study/lab report, myFolio entry, MCQ, 1 hour examination

Work-based learning
- 30% of this module will be carried out in the workplace

Advanced Laboratory/Industry Skills (Competence Module)

Synopsis of the curriculum:

- Animal cell culture including: key terminology; culture media; types of primary cell cultures.
- Major items of equipment, laminar flow hoods, microscopy, techniques for counting cells.
- Methods for cryo-preservation and retrieval of cells.
- Health and Safety and risks associated with human cell culture.
- Gel electrophoresis, ion exchange and gel filtration
- Genetic engineering techniques.
- UV/Vis spectrophotometry
- A basic understanding of chromatography and chromatographic methods

Specific learning outcomes:

- Demonstrate a range of higher level laboratory/industry skills (including cell culture techniques as well as spectrometric methods) with an aptitude to develop others in the future
- Demonstrate an ability to generate, evaluate, critically analyse and present practical work
- Show an understanding of the role of the laboratory technician/process operator in industry

Generic learning outcomes:

- The development of practical laboratory-based skills
- An ability to analyse, evaluate and correctly interpret data
- An ability to present and communicate data
- An ability to obtain and use information from a variety of sources as part of self-directed learning
- Time-management and organisational skills within the context of self-directed learning

Assessment

- Relevant work-based report and two hour practical examination

Work-based learning

- 60% of this module will be carried out in the workplace

GxP (Competence Module)

Indicative content:

- Basic Introduction to GxP
- Good Laboratory Practices (GLP)
- Good Manufacturing Practices (GMP)
- Reasons for validation
- Non-Conformance investigations and Reporting
- Good Aseptic Practices (GAP)
- Good Clinical Practices (GCP)
- Risk Based Compliance
- Quality Audits

Specific learning outcomes:

- Demonstrate an understanding of pharmaceutical/industry GxP requirements
- Have the ability to apply the relevant GxP legislation that is applicable to their own work environment
- Be able to apply the relevant tools and techniques used in GxP risk based compliance to a work related activity, producing a summary report and recommendations
- Understand the role of audits in quality management and carry out an internal compliance audit in accordance with the legislative requirements
- Know how to complete a non-conformance investigation and deviation report using the appropriate investigation techniques

Generic learning outcomes:

- An ability to analyse, evaluate and correctly interpret data
- An ability to present and communicate data
- An ability to obtain and use information from a variety of sources as part of self-directed learning
- Time-management and organisational skills within the context of self-directed learning

Assessment:

- Risk based compliance report, GxP audit report, myFolio entry, MCQ.

Work-based learning
- 40% of this module will be carried out in the workplace

Technology Transfer (Competence Module)

Indicative content:
- Managing Change
- Project Management Process
- Knowledge Management and Communication
- Project Management Tools
- Product Transfer
- Equipment and Process Changes
- Commissioning Process and Equipment

Specific learning outcomes:
- Demonstrate an understanding of product transfer as well as process and equipment improvements
- Demonstrate an understanding of effective commissioning of new equipment in accordance with best practice methodologies
- The ability to develop and implement a project plan in relation to a technology transfer project
- The ability to manage the process of change within their work environment

Generic learning outcomes:
- Develop proficient project management skills
- An ability to analyse, evaluate and correctly interpret data
- An ability to present and communicate data
- An ability to obtain and use information from a variety of sources and apply to the work place

Assessment:
- Case study of external and internal technology transfer, myFolio entry and MCQ

Work-based learning
- 40% of this module will be carried out in the workplace

Company Based Project (Competence Module)

This module will be an opportunity for students to demonstrate their laboratory, business, analytical and communication skills. Students will choose a practical project in consultation with their employer. They will produce a plan for the project showing time and resource management skills based on application of the scientific method/identified area of investigation. The plan will be implemented, the results evaluated and the findings presented in the form of a report and presentation. The student is required to apply research, analytical and planning skills, to use a variety of information sources, to work safely and accurately, and to report the investigation in a coherent, concise and rigorous form.
Students will be expected to apply their own judgement and initiative to the investigation and should not rely on their tutor inputting standard and supplied methods.

Specific learning outcomes:
- Demonstrate initiative and personal responsibility in the planning and execution of the business project
- Demonstrate the ability to undertake a critical evaluation of any literature/data/information relevant to the project
- Demonstrate the ability to systematically apply appropriate methodologies within the project
- Critically discuss and evaluate any data generated within the scope of the project
- Produce a detailed written report **and** a presentation to communicate clearly the findings to both specialist and non-specialist audience

Assessment;
- Detailed project report, poster and oral presentation with PowerPoint slides

Work-based learning
- 70% of this module will be carried out in the workplace

Programme Outcomes

The programme provides opportunities for students to develop and demonstrate knowledge and understanding, qualities, skills and other attributes in the following areas. The programme outcomes have references to the subject benchmarking statement for Biosciences *(**SB**)*.The programme outcomes also relate to the Foundation Degree benchmark (**FdB**). For more information on the skills provided by individual modules and on the specific learning outcomes see the module mapping.

Knowledge and Understanding **A. Knowledge and Understanding of:**	**Teaching/learning and assessment methods and strategies used to enable outcomes to be achieved and demonstrated**
1. A broad based core covering the major elements; processes & mechanisms of life, from molecular to cellular, and from organism to community. Together with specialised in-depth study (often career related) of some aspects of the subject areas. (SB) 2. Understanding of information and data, their setting within a theoretical framework, accompanied by critical analysis and assessment to enable understanding of the subject area. (SB) 3. Familiarity with terminology, nomenclature and classification systems. (SB) 4. Methods of acquiring, interpreting and critically analysing biological information through the use of texts, original papers, reports and data sets. (SB) 5. Knowledge of a range of communication techniques and methodologies relevant to the particular discipline and the workplace. (SB) 6. Engagement with some of the current developments in the biosciences and their applications, and the philosophical and ethical issues involved. (SB) 7. The capacity to give a clear and accurate account of a subject, marshal arguments in a mature way and engage in debate & dialogue both with specialists and non-specialists, using appropriate scientific language. (SB) 8. The ability to think independently, set tasks and solve problems. (SB) 9. Understanding the applicability of the biosciences to the careers of the learners. (SB) 10. Successful application in the workplace of the range of knowledge and skills learnt through the programme. (FdB) 11. The ability to apply underlying concepts and principles outside the context in which they were first studied, and the application of those principles in a work context. (FdB) 12. An ability to evaluate critically the appropriateness of different approaches to solving problems in their field of study and apply these in a work context. (FdB)	**Teaching and learning** Acquisition of outcomes 1-12 will be achieved primarily through extensive use of e-learning materials including: Theoretical content in the form of storyboards; video; links to related reading; and activities with feedback provided. Students will be required to produce a Reflective Portfolio on-line which will act as a record of all learning. The emphasis of the programme is to link the knowledge and learning to work-based learning and employment wherever possible. Problem solving scenarios will allow students to develop skills in applying knowledge from different parts of the programme and the work place to complex situations. Students will be expected to gain experience of working as a part of a team in the workplace and to effectively utilise their skills and knowledge in this setting. The Company Based Project provides an extended period of time to investigate an aspect of science or technology in detail using the knowledge and skills acquired during the degree programme. **Assessment** Formative assessment will include: progress tests; reports; portfolio entries; short essays; analysis of case studies; and presentations. Progress and attainment of learning outcomes will be determined by a variety of summative assessments including: unseen written examinations, some as Multiple Choice Questions (MCQ's); reports including the Company Based Project; essays; portfolio entries; case studies; and presentations.

Skills and Other Attributes **B. Intellectual Skills:** 13. The ability to recognise and apply subject-specific theories, paradigms, concepts or principles. (SB) 14. The ability to synthesize, analyze and summarise information critically, including published research or reports. (SB) 15. The ability to obtain and integrate several lines of subject-specific evidence to formulate and test hypotheses. (SB) 16. The application of subject knowledge and understanding to address both familiar and unfamiliar problems. (SB) 17. The ability to recognise moral & ethical issues together with the appreciation of professional codes of conduct. (SB) 18. An ability to develop and utilise effective project management skills. (SB) 19. The ability to initiate & undertake critical analysis of information, and to propose solutions to problems arising from that analysis in their field of study and in a work context. (FdB)	**Teaching and learning** Whilst most material will be in the form of directed self-learning it is essential that the student has regular contact on-line and by telephone with the tutors. There will be ongoing feedback provided for the developing Reflective Portfolio. In addition it is critical that the supervisor in the workplace is able to provide regular contact and support for the student. This allows the opportunity for students to apply their knowledge and understanding in a work-based setting. It also allows for the development of information transfer and effective communication skills. The programme allows students to develop enhanced problem solving skills as they progress to later years. Feedback sessions provide the opportunity for discussion around the approaches to problem solving in specific areas. **Assessment** Formative assessment will include: analysis of case studies; reports; portfolio entries; short essays; literature reviews; progress tests; and presentations. Progress and attainment of learning outcomes will be determined by a variety of summative assessments including: reports, especially the Company Based Project; essays; portfolio entries; case studies; presentations; and unseen written examinations, some as Multiple Choice Questions (MCQ's).
C Practical Skills 20. Undertake sufficient practical work to ensure competence in the basic experimental skills appropriate to the discipline under study. (SB) 21. The ability to design, plan, conduct and report on investigations, which may involve primary or secondary data, arising from individual or group projects. (SB) 22. The ability to obtain, record, collate and analyze data using appropriate techniques in their work discipline. (SB) 23. Undertake an extensive work based project in a responsible, safe and ethical manner. Paying due attention to relevant health & safety guidelines/procedures. (SB) 24. Undertake training, develop existing skills, and acquire new competences that will enable them to assume responsibility within their	**Teaching and learning** This includes "hands-on" practical skills but also broader skills including: numeracy; IT and communication. Practical experience in the work place will be essential to develop and enhance these skills. A summer school in both the first and second year of the programme will be used to provide more "hands-on" techniques/skills that are not available at work or locally. **Assessment** A number of methods will be used for both formative and summative assessment of these more practical skills including: practical tests or assessment at the University or in the work place; reports or other documents such as SOP's; oral

organisation. (FdB)	plus written presentations; project plans; and the Company Based Project Report.
Transferable Skills 25. The ability to use the internet and other electronic sources critically as a means of communication and a source of information. (SB) 26. A working knowledge of how to cite and reference work in an appropriate manner, including the avoidance of plagiarism. (SB) 27. An ability to effectively communicate information, arguments and analysis, in a variety of forms, to specialist and non-specialist audiences. (FdB) 28. Develop numeracy skills and have a working appreciation of the terms: validity; accuracy; calibration; precision; replicability. (SB) 29. Extensive experience of solving problems by a variety of methods, including the use of computers. (SB) 30. An ability to recognise and respect the views and opinions of other team members and develop good negotiating skills. (SB) 31. The ability to evaluate ones performance as an individual & team member as well as being able to assess the performance of others. (SB) 32. Develop an adaptable, flexible and effective approach to study and work. (SB) 33. Develop the qualities and skills necessary for employment and progression requiring the exercise of personal responsibility and decision making. (FdB)	**Teaching and learning** Transferable skills will be incorporated within modules, commencing in year 1 of the programme and a becoming enhanced in the later years. Students will learn by doing with an emphasis on work-based learning. There will be many opportunities for problem solving and presentations and reports will provide the opportunity to enhance communication skills. **Assessment** Again a number of methods will be used for formative and summative assessment including: presentations; case studies; portfolio entries; project plans; and the Company Based Project Report.

Support for Students and their Learning

It is recognised that the students will need to have multiple networks of support including: Workplace Supervisor & Workplace Mentor; Programme Leader; Module Leaders. Each of these will have a specific defined role but equally allow the student to have alternative routes to access the support they require.

- An induction programme will take place for all new students.
- An induction event will be carried out for all supervisors.
- A dedicated e-learning environment will be available through the University Virtual Learning Environment (VLE) - Moodle.
- Each student will have an online Reflective Portfolio including a Personal Development Plan (PDP) through myFolio which will hold all critical information. This will be evaluated at very regular intervals through module and programme learning.
- Orientation sessions at the start of each module on the programme.
- Library provision through the University of Kent at the Drill Hall Library and access to online resources.
- Laboratory and IT facilities for the summer school.
- General Regulations, Students' Union Code of Practice, Students' Charter (University Handbook).
- University central support services.

Entry Profile

The minimum age to study a degree programme at the university is normally at least 17 years old by 20 September in the year the course begins. There is no upper age limit.

Entry Route

• **A levels and AS levels:**	• 200 points including DD at GCE A2 level for Biology and another science subject
• **VCE A level (previously AGNVQ):**	• Vocational Science based A level (Double award 12 units) and a pass in an approved English Language qualification.
• **Access/Foundation Programmes:**	• A satisfactory pass in an approved Science Based Foundation or Access programme. Please check with the University beforehand that we will accept the Access/Foundation syllabus you took.
• **BTEC National Certificates/Diplomas:**	• BTEC National Certificate in Science (merit level) and a pass in an approved English language qualification • BTEC National Diploma in Science (merit level) and a pass in an approved English language qualification. • BTEC Higher National Diploma in Science and a pass in an approved English language qualification.
• **International Baccalaureate**	• 26/30 points (12/14 at Higher). The course studied must contain a significant content of Science at the required level. Please check with the University beforehand that you have studied sufficient Science at the required level.
• **Irish Leaving Certificate:**	• Passes in five Higher level subjects (including two Science subjects) sitting plus Ordinary level English grade C.
• **Scottish qualifications:**	• Five passes in approved subjects at Advanced Higher or Higher grade (including two Science subjects) and a pass at Intermediate 2 grade in English Language.
• **Mature applicants:**	• If you are a mature student without the traditional qualifications listed here, we ask you for proof of any recent study you have done or of your ability to complete a degree programme successfully.
• **Accreditation of Prior (Experiential) Learning (AP(E)L):**	• We will consider any evidence you have of previous study and work based learning, and equate this to your ability to follow your proposed programme.

What does this programme have to offer?

- This programme is unique and innovative in its structure. It has been developed with employer input in response to industry needs nationally.
- It will provide students with the opportunity to further develop their skills and knowledge that will enable them to assume responsibility within organisations.
- It will provide the student with the qualities and transferable skills to allow them to be highly effective in their work place.
- The programme will develop student skills to critically analyse complex information and propose solutions to problems in a work context.

Personal Profile

- You will be employed in a sector of the Applied Biosciences.
- You may either be a new employee with the need to develop scientific knowledge and sector skills; **or** you may be re-skilling in your workplace; **or** you may be enhancing your skills and knowledge with a view to career enhancement.
- You will have a suitable level of numeracy and communication skills and a willingness to develop these further on the programme.
- You should have a willingness to develop the skills to critically analyse work based problems and effectively propose and communicate solutions.

Indicators of Quality and Standards
• External examiner reports. • Programme results and awards. • Employer feedback.

The following reference points were used in creating these specifications:
• QAA subject benchmark for Biosciences (2007) - [QAA 205 12/07]. http://www.qaa.ac.uk/Publications/InformationAndGuidance/Documents/Biosciences07.pdf • QAA Foundation Degree Qualification benchmark (2010) -[QAA 345 05/10]. http://www.qaa.ac.uk/Publications/InformationAndGuidance/Documents/Foundation-degree-qualification-benchmark.pdf • QAA Qualification Descriptors. http://www.qaa.ac.uk/Publications/InformationAndGuidance/Documents/FHEQ08.pdf • The University Learning and Teaching Strategy.

UNIVERSITY OF KENT

Appendix 1
Applied Bioscience Technology Foundation Degree
Modular Framework (all modules 15 credit except Project at 60 credits)