Programme Specification

BSc (Hons) Applied Biosciences: Bioinformatics

School:	Science, Technology and Health
Subject area:	Biosciences
Entry from academic year:	2021-22
in the month(s) of	September
Awarding institution:	York St John University
Teaching institution:	York St John University
Delivery location:	York St John University
Programme/s accredited by:	Royal Society of Biology
Exit awards:	Certificate of Higher Education Biological Sciences Diploma of Higher Education Biosciences BSc (Ord) Biosciences
UCAS code / GTTR / other:	7Y67
Joint Honours combinations:	Not applicable
QAA subject benchmark statement(s):	Biosciences (2019)
Mode/s of study:	Undergraduate periods of study[1] for full-time / part-time
Language of study:	English
Paired with Foundation Year	No
Study abroad opportunities:	No
Opt-in YSJU Placement Year opportunity:	Yes

Introduction and special features

Introduction

This Applied Biosciences: Bioinformatics programme provides a multidisciplinary approach to the study of human disease, with a specialism in analysis of complex data and computational biology. It encompasses the causes of disease and the effects of disease on the normal structure and functions of the human body. It also provides an understanding of the scientific basis for the laboratory investigation, diagnosis, monitoring and treatment of disease. Graduates gain an understanding of applied biosciences and bioinformatics research to develop new therapeutic intervention strategies and a thorough understanding of the creation, analysis and evaluation of large data sets.

As a graduate from this degree programme you will have a broad-based scientific education coupled with relevant and current bioinformatics skills necessary a wide-range of scientific careers. A key aspect of this degree is that you have a specialism in bioinformatics with detailed human biology knowledge and understanding. You may wish to pursue a career as a laboratory-based or non-laboratory based scientist in the Pharmaceutical or Biotechnology Industry or other related industries, academic research or teaching. You will have experience of developing systems to gather data, creating data algorithms and computer software to identify and classify components of a biological system (including DNA and protein sequences). Examples of employment could be: constructing a survey methodology, designing a clinical trial for a new medication, and

[1] The standard period of study will apply unless otherwise stated

developing databases to compile large data sets from activities such as gene expression profiling or protein expression.

Applied Biosciences: Bioinformatics sits within our Applied Biosciences suite of programmes. Our Applied Biosciences courses have distinct award titles but these titles represent a specialism, not a separate degree course. The Applied Biosciences suite will share all first year modules with the existing Biomedical Science degree and have the same entry criteria. You will be able to swap between courses at the end of your first year, but once you start your second year, you will need to remain on your chosen specialist route. Once you have studied all subjects in your first year, you can make an informed choice about which area you enjoy and would like to specialise in.

Admissions criteria

You must meet the University's general entry criteria for undergraduate/ study. In addition, you must have:

- A minimum of BCC from A2 subjects to include grade B or above in Biology. For applicants who have already achieved their A2s we would consider CCC if all subjects are sciences.
- DMM or higher from a science based BTEC Extended Diploma with a minimum of three Biology specific modules within the overall diploma. Where this is not evidenced an additional A2/AS in Biology may be required.

If your first language is not English, you need to take an IELTS test or an equivalent qualification accepted by the University (see https://www.yorksj.ac.uk/international/how-to-apply/english-language-requirements/).

If you do not have traditional qualifications, you may be eligible for entry on the basis of Accredited Prior (Experiential) Learning (APL/APEL). We also consider applications for entry with advanced standing.

Programme aim(s)

The programme is intended to:

- Provide a stimulating and well-informed programme of study in Applied Bioscience: Bioinformatics for students from diverse cultural and educational backgrounds, with embedded small group activities and vocational skills
- Enhance learning by providing you with supported open learning and technology enhanced learning opportunities to suit your interests and/or career aspirations
- Develop subject knowledge and understanding in the core areas of Biosciences and Bioinformatics as defined in the curriculum to reflect the Subject Benchmark Statement and accreditation criteria
- Develop core discipline specific and research skills as outlined in the curriculum to reflect the Subject Benchmark Statement and accreditation criteria
- Develop personal transferable and entrepreneurial skills which enhance your employability and / or aptitude for further education
- Provide a supportive and structured environment in which you are encouraged to develop your independent study skills required for lifelong learning
- Promote research-led and research-informed teaching in level 5 modules and all level 6 modules

Programme learning outcomes

Upon successful completion of this level of study students will be able to:

Level 4

4.1 Demonstrate an understanding of the underlying concepts and principles of core aspects of Biosciences including Cell Biology, Genetics, Biochemistry, Molecular Biology, Human Anatomy and Physiology, Immunology, Microbiology.
4.2 Apply basic Biosciences concepts, theories and issues in a systematic way.
4.3 Present and interpret qualitative and quantitative data, to develop research skills, lines of argument and make sound judgements in accordance with basic theories and concepts in Biosciences.
4.4 Classify perspectives, skills and knowledge gained across Biosciences disciplines.
4.5 Communicate effectively using a range of basic skills appropriate for the audience and purpose, demonstrating team working, negotiating and decision-making skills
4.6 Create scientific documents and communicate the results accurately and reliably, with structured and coherent arguments
4.7 Demonstrate a range of basic key transferable skills (including personal responsibility; awareness of ethics; health and safety assessments; good laboratory practice and problem solving) appropriate for further study and future employment in Biosciences.

Level 5

5.1 Demonstrate a detailed understanding of the underlying values and principles relevant to Biosciences and a developing personal stance which draws on their increasing knowledge.
5.2 Analyse more complex Bioscience concepts, theories and research strategies in a systematic way.
5.3 Select, evaluate and appraise research, experimental and clinical laboratory techniques and be able to apply them to theoretical, experimental and laboratory investigations
5.4 Implement theoretical perspectives and concepts in Bioscience specialisms of clinical biochemistry, molecular biology, medical microbiology, data analysis and computational biology.
5.5 Communicate subject-relevant information, ideas and arguments effectively to specialist and non-specialist audiences through interpretation and critical review of scientific research literature
5.6 Develop entrepreneurial skills through creative thinking and applying new and interesting approaches to a problem or situation.
5.7 Demonstrate an ability to apply knowledge and skills effectively in decision-making in the context of growing maturity as an independent learner.

Level 6

6.1 Demonstrate a complex understanding of the underlying values and principles relevant to Biosciences and a well-developed personal stance which draws on their increasing knowledge.
6.2 Appraise and select scholarly research in order to evaluate key aspects of Biosciences and Bioinformatics.
6.3 Generate and critically analyse complex data and synthesise ideas in Biosciences and Bioinformatics to design, plan and execute a research project
6.4 Devise and plan independent investigative work; evaluate ethical considerations; make use of scholarly reviews and primary sources and undertake autonomous learning
6.5 Communicate reasoned judgments and arguments that are evidence based and use sound critical analysis and understanding of complex scientific data.
6.6 Evaluate their application of entrepreneurial skills, concepts, theoretical and empirical knowledge appropriate to the Biosciences.
6.7 Manage and reflect critically upon own learning.

Programme structure

The curriculum is designed to enable you to develop the necessary level of knowledge of Biosciences and Bioinformatics to enable you to pursue a career in one of the many professions that you can choose to follow. In Level 4, you will study normal human biology plus some microbiology and immunology at the level of the molecule, gene, cell, organ and organism. Laboratory sessions, run in conjunction with the theoretical components, will give you the opportunity to enhance your understanding of particular topics. You will be introduced to basic laboratory skills, alongside qualitative and quantitative data handling / interpretation. You will also develop your key skills during Level 4 and you will start to develop a progress file. You will be encouraged to develop a reflective attitude to your learning and develop numerical, written and oral communication, IT and group working skills.

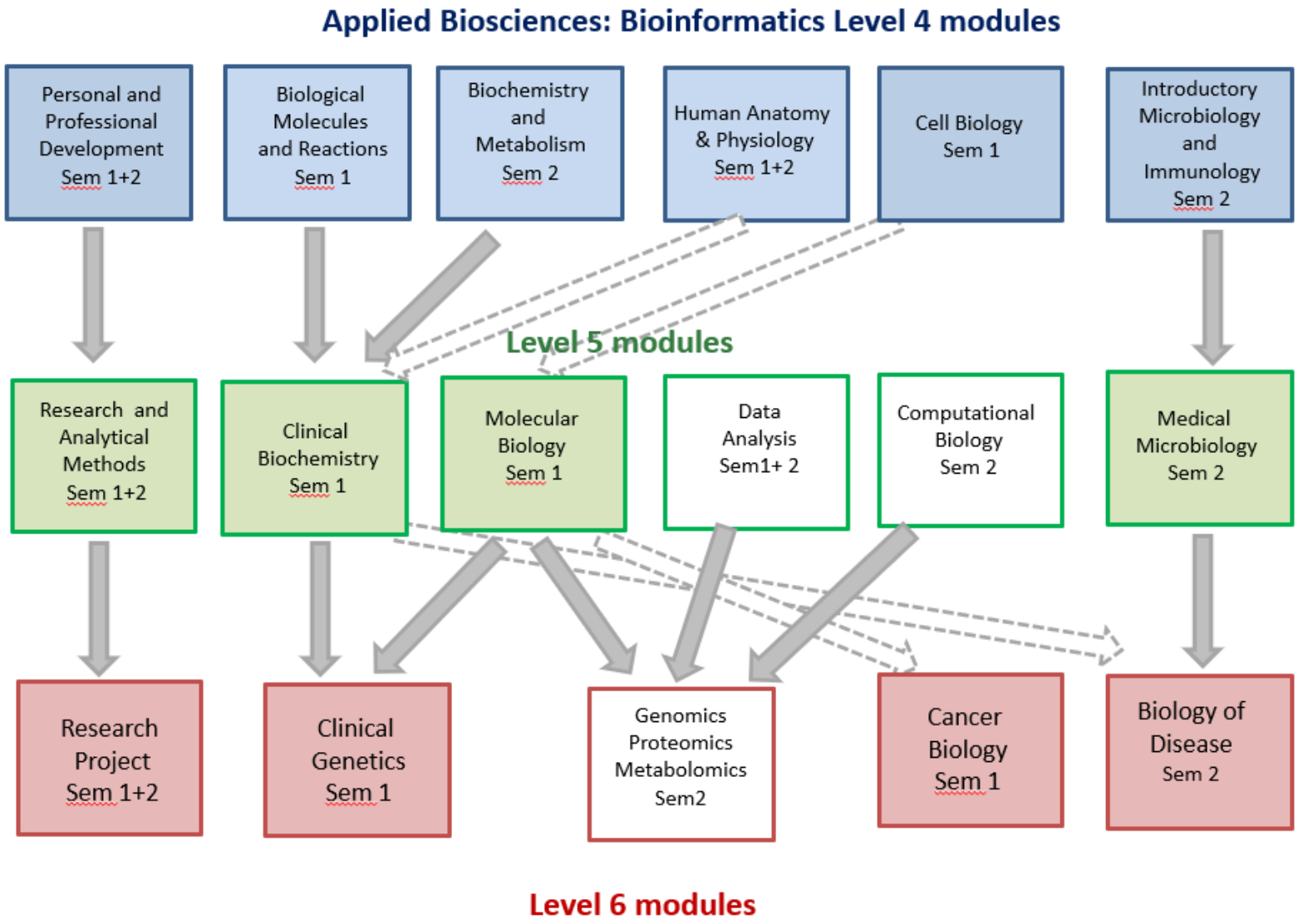
In Level 5, the curriculum continues to concentrate on core areas of Bioscience relevant to analysis and evaluation of large data sets. You will start to examine the processes that disrupt normal human biological function and so cause disease, developing your appreciation of how research informs our approaches to prognosis diagnosis and treatment. You will begin to study processes and procedures relevant to Bioinformatics, including computational biology, creating, storing and retrieving data. You will also develop personal transferable skills and reflect on how these will prepare you for the working environment. You will be encouraged to self-evaluate your skills and identify and address areas for improvement. In Level 5 you will increase your depth of knowledge and laboratory and data handling skills and will develop autonomy in your learning by using published research articles to inform your individual and group work, taking increasing responsibility for achieving the learning outcomes of your modules and level of study. Case studies and workshop material in Level 5 provides an opportunity for interaction with each other, discussion, debate and assimilation of ideas.

In Level 6 the curriculum continues to allow you to develop your knowledge and understanding of human disease and you will study in depth a range of current research led and informed topics in Biosciences and Bioinformatics. You will gain an appreciation of: the pathogenic mechanisms (endogenous and exogenous) associated with the development, progression, manifestation and complications of disease in human beings; the laboratory diagnosis and management of a range of human diseases and detailed analysis of the complex data sets from genetic, protein and metabolic pathways that inform and progress our research.

Ethics / COSHH, health and safety training and Good Laboratory Practice are addressed throughout the programme in the BIO4001M *Personal and Professional Development*, BIO5001M *Research and Analytical Methods* and BIO6001M *Research Project* modules. A *viva voce* in BIO5001M *Research and Analytical Methods* and BIO6008M *Genomics, Proteomics and Metabolomics* modules prepare you for analogous situations after graduation, in either further study or in job interviews. You will also be given “live briefs” to work on and then discuss with visiting practitioners and lecturers to gain insight into real life issues and work-based learning in a variety of employment settings and develop your own professional standards.

You will also continue to reflect upon ways to improve your own learning and performance and to develop autonomous learning skills. Laboratory sessions along with the research project will allow you to improve your data handling, manipulation, analysis and critical interpretation skills and increase the autonomy with which you apply them. You will be expected to take increasing responsibility for your own learning, organisation and planning of academic, theoretical and laboratory work, as well as group and individual outcomes. Throughout the curriculum you will have the opportunity to develop the skills associated with good laboratory practice, professional standards and the importance of quality control and quality assurance.

Module Summary and Linkages for the Applied Biosciences: Bioinformatics Programme:



Modules for BSc (Hons) Applied Biosciences: Bioinformatics

Code	Level	Semester	Title	Credits	Module status	
					compulsory or optional to take **C or O**	non-compensatable or compensatable **NC or X**
BIO4001M	4	1&2	Personal and Professional Development	20	C	X
BIO4002M	4	1&2	Human Anatomy and Physiology	20	C	X
BIO4003M	4	1	Biological Molecules and Reactions	20	C	X
BIO4004M	4	1	Cell Biology	20	C	X
BIO4005M	4	2	Biochemistry and Metabolism	20	C	X
BIO4006M	4	2	Introductory Microbiology and Immunology	20	C	X
BIO5001M	5	1&2	Research and Analytical Methods	20	C	X
BIO5008M	5	1&2	Data Analysis	20	C	X
BIO5003M	5	1	Clinical Biochemistry	20	C	X
BIO5004M	5	1	Molecular Biology	20	C	X
BIO5005M	5	2	Medical Microbiology	20	C	X
BIO5011M	5	2	Computational Biology	20	C	X
BIO6001M	6	1&2	Research Project	40	C	NC
BIO6002M	6	1	Cancer Biology	20	C	X
BIO6003M	6	1	Clinical Genetics	20	C	X
BIO6004M	6	2	Biology of Disease	20	C	X
BIO6008M	6	2	Genomics, Proteomics and Metabolomics	20	C	X

Any modules that must be passed for progression or award are indicated in the table above as non-compensatable. A non-compensatable module is one that must be passed at the relevant level (with a mark of 40) in order to progress.

Learning, teaching and assessment

The teaching, learning and assessment strategy takes into consideration the learning outcomes for the programme, progression through levels of study, the nature of topic studied and the need for you to demonstrate greater autonomy in your learning as you progress through the programme. We believe that our broad portfolio of assessments is a driver for learning, ensures learning outcomes are met, rewards success and provides excellent student feedback.

In each of the modules you will be exposed to a range of learning, teaching and assessment approaches to actively engage you in the ways of thinking and practicing in the disciplines of Biosciences and

Bioinformatics. Typically, within modules, you will be guided through several themes over the course of a semester or year. For example, module BIO4003M *Biological Molecules and Reactions* will consider molecular structure, functional groups and reaction mechanisms over the semester. Your learning in relation to these themes will be facilitated by: lecture / workshop sessions that provide an overview of the theory in the area; give you the opportunity to discuss theory and application to practice and test out your understanding with peers and the tutor and practical sessions to teach you relevant skills and carry out experiments. These core sessions will be supplemented by formative activities in the laboratory to complete related practical tasks, the Virtual Learning Environment where you will complete a self-assessment quiz or piece of reading and revision sessions to discuss your academic development in the topic area.

In level 4 this will be highly structured, with tasks to 'scaffold' learning and help you make the transition into university, however as your studies progress you will be expected to manage your own learning and undertake independent tasks. In particular, you will be encouraged to critically engage with research literature and discuss how evidence can be used to support and develop theory and practice.

Assessment on the programme has been designed to ensure that it supports your learning, in addition to monitoring your skills and understanding. This means that formative assessments are integral to all modules and are designed to engage you with meaningful feedback and develop an ability to self-evaluate, prior to submission of the summative work. As you progress through your Applied Biosciences: Bioinformatics degree, the assessments change and become more challenging to reflect the increase in your knowledge and abilities. Hence in level 4 you will encounter a number of short tests to determine knowledge and practical reports to give you the opportunity to gain experience in report writing, data handling and interpretation and scientific writing. In levels 5 and 6 you will demonstrate increasing skills of analysis, synthesis and criticism through a wide variety of assessment strategies, including written and oral examinations, report writing, case studies, group work, essays, scientific writing, presentations and the research project report. In particular, the project report provides a major opportunity to demonstrate autonomy in data handling and critical interpretation in a research context. All assessments have been carefully scheduled to ensure they are progressive and well-spaced throughout the programme.

Academic engagement is supported via regular feedback from academic tutors and module leaders, in order to facilitate your development and improve your engagement with your studies. You can discuss suggestions for performance improvement with both academics and peers and the Study Development Team. The use of formal and informal feedback throughout the modules will develop your ability to evaluate your progress and build confidence. The programme design allows you to develop many skills that can be applied to new tasks and situations and helps you to engage with the curriculum. Technical skills will be assessed by a range of laboratory competency-based assessments in addition to the practical classes, data analysis and interpretation and technical badges awarded throughout the programme. Transferable skills will be assessed via a range of assessment types including written and oral communication, group working and problem solving. Details of the specific skills assessment throughout the programme can be found in all module descriptors.

Progression and graduation requirements

The University's general regulations for undergraduate awards apply to this programme.

Any modules that must be passed for progression or award are indicated in the Programme Structure section as non-compensatable.

Internal and external reference points

This programme specification was formulated with reference to:

- University mission and values
- University 2026 Strategy
- QAA subject benchmark statements
- Frameworks for Higher Education Qualifications
-

Date written / revised:April 2020
Programme originally approved: