Undergraduate Foundation Programme
Engineering & Physical Sciences

ONCAMPUS

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Modules

Modules vary by **ON**CAMPUS centre as shown in the table below and may change depending on progression degree. Students will have English incorporated into their study plan if required.

Centre	Pure Mathematics	Physics	Skills for Science	Chemistry	Introduction to Programming	Skills for Computing
ONCAMPUS ASTON	✔	✔	✔	✔ *		✔ ***
ONCAMPUS HULL	✔	✔	✔	✔ *		
ONCAMPUS LONDON	✔	✔	✔		✔ *	
ONCAMPUS LONDON SOUTH BANK	✔	✔	✔	✔ *		
ONCAMPUS LOUGHBOROUGH	✔	✔	✔	✔ *		
ONCAMPUS ** READING	✔	✔	✔			
ONCAMPUS SOUTHAMPTON	✔	✔	✔	✔ *		
ONCAMPUS SUNDERLAND	✔	✔	✔			
ONCAMPUS UK NORTH	✔	✔	✔			

* This module may be studied as an alternative module to Physics dependent on progression degree.

** The Engineering and Physical Sciences pathway at **ON**CAMPUS Reading will be delivered at **ON**CAMPUS London.

*** This module may be studied as an alternative module to Skills for Science dependent on progression degree.

Pure Mathematics Module

The aim of the module is to enable you to develop your understanding of mathematics using a variety of techniques and methods to solve given problems. It gives you the opportunity to apply your knowledge to real life contexts and prepares you for future undergraduate studies across multiple disciplines.

Statistical methods and mechanics will be covered in the 'Skills for Science' element of the pathway.

Learning Outcomes and Assessment Criteria

01
Recall and use mathematical notation, rules, and definitions

1. Use mathematical language and notation accurately

2. Recall and use rules and formulae

3. Understand that mathematical expressions can often be written in more than one form

02
Know a range of mathematical methods and be able to communicate solutions effectively

1. Demonstrate a sound understanding of mathematical methods outlined in the module content

2. Use logical reasoning and precise statements to create and present mathematical arguments

3. Use appropriate diagrams and sketches to create and present mathematical arguments

4. Present steps of the method clearly within answers

03
Select and apply the correct technique(s) to solve any given problem, drawing conclusions and explaining reasoning

1. Interpret mathematical language to understand problem requirements

2. Demonstrate the use of judgement for appropriate tools and techniques to solve any given problem

3. Show understanding of coherence and progression in maths by connecting methods from different topics within the problem solution

4. Assess the validity of answers and reject solutions based on contraints

5. Offer explanations for, or interpretations of, solutions

04
Apply knowledge and understanding to solve problems involving subject contexts

1. Convert problems written in contexts into mathematical processes

2. Offer explanations for, or interpretations of, solutions in the context of the original problem

Topics list

1. Alegebraic techniques

2. Quadratic functions

3. Complex numbers

4. Simultaneous equations

5. Inequalities

6. Sketching curves

7. Graph transformations

8. Linear equations

9. Coordinate geometry

10. Differentiation

11. Integration

12. Binomial expansion

13. Trigonometry

14. Trigonometrical identities

15. Trapezium Rule

16. Exponentials and Logarithms

Physics Module

The aim of the module is to enable you to develop your understanding of the fundamental principles of physics, including an ability to work with the concepts mathematically to solve given problems.

You will gain experience of safe working practice in a laboratory setting and confidence in interpreting experimental data and observations. It will give you the opportunity to apply your knowledge to real life contexts and prepare you for future undergraduate studies.

Topics list

1. Vectors and scalars

2. Forces

3. Newton's Law and momentum

4. Kinematics and projectile motion

5. Work, energy and power

6. Materials and mechanical properties of matter

7. Electrical potential difference

8. Current and resistance

9. Electric circuits

10. Capacitance

11. Electric charge and fields

12. Gravitational fields

13. Thermal concepts

14. Gas Laws

15. Lab practical experiments

01

Recall and select appropriate physical laws, principles and formulae to given problems and communicate solutions effectively

1. Use appropriate methodology to answer scientific questions and solve scientific problems

2. Recall and use correct formulae and equations to solve quantitative problems

3. Present steps of the method clearly and accurately within answers

02

Apply physical laws and principles to theoretical and practical problems, with an awareness of how different areas within the subject relate to each other

1. Apply knowledge and understanding of scientific ideas, processes, techniques and procedures to given problems

2. Explain and interpret solutions in the context of the original problem

3. Show understanding of coherence in physics by connecting ideas and methods from different topics

03

Demonstrate an understanding of safe working practice through experimental work, including the significance and limitations of experimental data and observations

1. Demonstrate understanding of a wide range of experimental and practical instruments, equipment and techniques

2. Use appropriate apparatus/methods to record a range of measurements

04

Record, interpret and analyse scientific data and procedures to inform recommendations for future work

1. Present data clearly and accurately with the use of appropriate tables and graphs

2. Interpret scientific results, recognising correlations and causal relationships

3. Critique experimental design and processes within a given experiment

4. Offer suitable recommendations and improvements that can be implemented in future experimental work

Skills for Science Module

This module aims to equip you with the skills and strategies required for successful completion of your **ON**CAMPUS programme and prepare you for future studies.

You will gain experience in laboratory work, develop your data analysis skills and understand how to critique your findings. You will be able to draw conclusions from data, organise facts and figures in a logical way and test hypotheses. The module will also develop your ability to become an independent learner, including critical evaluation and reflective skills.

Learning Outcomes and Assessment Criteria

01
Demonstrate and describe ethical, safe and skilful practical techniques, selecting appropriate methods for an investigation

1. Recognise the importance of safe working practice within a laboratory environment

2. Explain how to identify potential risks and hazards to an investigation and the environment

3. Demonstrate an analysis of safe equipment use and safe methodology procedures of an investigation

02
Interpret and analyse the importance of reliable results in experimental investigations

1. Demonstrate ability to identify uncertainties in measurements and select appropriate techniques to perform error calculations

2. Interpret the reliability of results and analyse how potential sources of error, uncertainties and anomalies impact findings

03
Evaluate the impact of scientific methodologies, making suitable recommendations for future work

1. Critique experimental design and processes within a given experiment

2. Offer suitable recommendations and improvements that can be implemented in future experimental work

04
Present and communicate information and data effectively to meet audience needs

1. Produce an effective and informative PowerPoint presentation

2. Demonstrate the necessary skills to deliver a professional presentation to an audience

3. Engage with an audience to explore the subject matter in more detail

Chemistry Module

The aim of the module is to enable you to develop your understanding of chemical principles and materials, using a variety of techniques and methods to solve given problems.

You will gain experience of safe working practice in a laboratory setting and confidence in interpreting experimental data and observations. It will give you the opportunity to apply your knowledge to real life contexts and prepare you for future undergraduate studies within the area of chemistry and chemical engineering.

Learning Outcomes and Assessment Criteria

01
Recall and select appropriate chemical terminology and equations to given problems and communicate solutions effectively

1. Define and descibe key terms, processes and theories

2. Use appropriate diagrams and sketches to explain key ideas

3. Recall and use correct chemical formulae and equations to solve quantitative problems

4. Present steps of the method clearly and accurately within answers

02
Apply understanding of chemical principles to theoretical and practical problems, with an awareness of how different areas within the subject relate to each other

1. Demonstrate the use of judgement for appropriate tools and techniques to solve any given problem

2. Explain and interpret solutions in the context of the original problem

3. Show understanding of coherence in chemistry by connecting ideas and methods from different topics

03
Demonstrate an understanding of safe working practice through experimental work, including appropriate risk assessment

1. Outline the procedure of an experiment, including an accurate mthod and list of materials

2. Identify potential hazards, risks, and safety precautions required to complete a safe experiment

04
Record, interpret and analyse scientific data and procedures to inform recommendations for future work

1. Present data clearly and accurately with the use of appropriate tables and graphs

2. Interpret scientific results and identify potential sources of error, uncertainties, and anomalies

3. Critique experimental design and processes within a given experiment

4. Offer suitable recommendations and improvements that can be implemented in future experimental work

Topics list

1. Atomic structure

2. Quantitative Chemistry

3. Periodicity

4. Bonding

5. Energetics

6. Kinetics

7. Equilibrium

8. Acids and bases

9. Redox

10. Organic cChemistry

11. Lab practical experiments

Introduction to Programming Module

This module offers a comprehensive education in computer science principles, document presentation, and problem-solving, with a focus on equipping you with essential skills for real-world challenges. It covers three key areas: LaTeX, Unix, and Python.

In the LaTeX section, you will learn to create documents with equations, figures, tables, and bibliographies, as well as troubleshoot errors and use LaTeX packages for professional presentations. Unix commands, file and directory management, permissions, regular expressions, text editing, and basic shell scripting are covered to provide a strong foundation in Unix-based systems.

The Python component introduces you with the language's fundamentals, including variable declaration, numeric operations, and core data types like strings, lists, dictionaries, and tuples. You will also learn about logical operations, loops, list comprehensions, lambda abstraction, functions, graph plotting, modular script structuring, and package integration.

Overall, this module imparts a well-rounded understanding of these essential topics in computer science, empowering you with the tools needed to analyse problems computationally and design and program computer systems effectively.

Learning Outcomes and Assessment Criteria

01
Demonstrate knowledge of typesetting documents and using a markup language

1. Demonstrate skills in using a makup language in notebooks
2. Produce a well-structured report to document outcomes of computer facilitated research
3. Produce a scientific poster to facilitate presentation of one's research for discussion with colleagues

02
Present information effectively to meet audience needs.

1. Demonstrate the necessary skills to deliver a professional presentation in the form of a poster to an audience
2. Engage with the public to explore subject matter in more detail
3. Produce effective programme documentation in the form of scripts and a report

03
Use simple Unix commands to create and manipulate files and folders, perform multiple complex tasks using one simple command

1. Demonstrate use of basic Unix commands
2. Demonstrate different techniques to create and read files and content holders
3. Demonstrate ability to move and manipulate files and folders
4. Apply some regular expressions to pipes and filters
5. Create shell scripts in an editor to perfoman simple tasks

04
Demonstrate knowledge and understanding of the principles and concepts of computer science, including abstraction, logic, algorithms, and data representation

1. Use of regular expressions in pipes
2. Understand and use data types and data structures
3. Use of lamba abstraction in list comprehension
4. Understand the concept of re-use in creating functions
5. Define problems use Boolean logic and manipulate Boolean expressions
6. Understand the implications of use of global and local variables
7. Understand some standard algorithms such as bubble sort or Dijkstra's shortest path algorithm
8. Understand and use comments in scripts

05
Apply knowledge and understanding of the principles and concepts of computer science, including to analyse problems in computational terms

1. Apply the thinking skills involved in analysing problems and processes such as thinking abstractly, thinking ahead, thinking procedurally, logically and concurrently
2. Apply programming techniques such as sequence, iteration and branching
3. Decompose the programs into modules, functions and procedures
4. Recognise, decompose, visualise and abstract problems to make them solvable by computational methods
5. Analysis or suitability and efficiency of different algorithms
6. Produce, apply and interpret pseudocode statements to describe computing tasks or processes and solve problems

06
Design, program and evaluate computer systems that solve problems, making reasoned judgements about these and presenting conclusions

1. Identify and research a problem for the final project
2. Design the solution, i.e. decompose the problem, describe the solution and the approach to testing
3. Develop the solution through iterative development processes and testing to inform development
4. Evaluate the solution in terms of user feedback, success criteria
5. Describe the final product and its maintenance and development

Skills for Computing Module

This module aims to equip you with the skills and strategies required for the successful completion of your ONCAMPUS programme and prepare you for future studies.

You will gain experience in core computing skills, ethical issues relating to information systems and financial aspects of computing. You will be able to draw conclusions from business for computing data, organise facts and figures in a logical way to review case studies. The module will also develop your ability to become an independent learner, including computational problem-solving and reviewing business for computing articles.

Learning Outcomes and Assessment Criteria

01
Present and communicate information and data effectively to meet audience needs regarding the ethical issues relating to information systems

1. Produce an effective and informative PowerPoint presentation

2. Demonstrate the necessary skills to deliver a professional presentation to an audience

3. Engage with an audience to explore the subject matter in more detail

02
Define business problems, discuss the role of digital systems in solving those problems, and evaluate their success

1. Describe some of the central challenges modern business organisations face, including those associated with growing competition, rapid technological innovation, and a changing international landscape

2. Identify business problems, design solutions to identified problems, discuss the role of digital systems in solving those problems, and evaluate their success

3. Evaluate, with reference to business case studies, how effectively business challenges can be met with digital planning and stratefy, and how they aid the management of those businesses

03
Discuss the roles of software and different hardware in computer operations

1. Analyse the socio-technical impacts of the information technology systems

2. Describe diferent hardware components of the computer and their roles

3. Discuss the roles of software in computer operations

04
Apply computational theory to design solutions using psuedocode

1. Apply computational theory to design solutions using psuedocode

2. Apply algorithmic principles as tools and techniques to design and test solutions for real-world problems

Resources and reading list

Pure Mathematics

- Smith, H. (ed.) (2017). *Pearson Edexcel International AS / A Level Economics: Pure Mathematics Year 1 / AS.* London: Pearson Education Limited.

Physics

- Garrett, E., *et al.* (eds.) (2015). *A-Level Physics Exam Board: Edexcel: Complete Revision & Practice.* Coordination Group Publications Ltd (CGP).
- Johnson, K. *et al.* (2015). *Advanced Physics for You.* 2nd edn. Oxford: Oxford University Press.

Skills for Science

- Conoley, C. (2014). *Science Skills A Level Chemistry: Strengthen your science, maths and written communication skills for A level Chemistry.* Collins Educational.
- Galloway, I. (2014). *Science Skills A Level Physics: Strengthen your science, maths and written communication skills for A level Physics.* Collins Educational.
- Garrett, E., *et al.* (eds.) (2015). *Essential Maths Skills for A-Level Physics: Study Notes, Examples & Practice Questions.* Coordination Group Publications Ltd (CGP)

Chemistry

- Falkner, M., *et al.* (eds.) (2018). *A-Level Chemistry Exam Board: AQA: Complete Revision & Practice.* Coordination Group Publications Ltd (CGP)
- Ramsden, E.N. (2001). *Calculations for A-level Chemistry.* 4th edn. Oxford: OUP Oxford.

Introduction to Programming

- Kottwitz, S. (2021). *LaTeX Beginner's Guide: Create visually appealing texts, articles, and books for business and science using LaTeX.* 2nd edn. Birmingham: Packt Publishing Ltd.
- Aibara, F.K. (2019). *A short introduction to LaTeX: A book for beginners.* CreateSpace Independent Publishing Platform.
- Lutz, M. (2013). *Learning python: Powerful object-oriented programming.* 5th edn. O'Reilly.

Skills for Computing

- Bocij, P., Greasley, A. and Hickie, S. (2018). *Business Information Systems: Technology, development and management for the modern business.* 6th edn. Harlow: Pearson.
- Heathcote, P.M. and Heathcote, R.S.U. (2016). *AQA AS and A Level Computer Science.* Dorset: PG Online Limited.
- Foster, M. (2022). *AQA A Level Computer Science (7517): Revision Booklet.* Independently published.

Example Timetable

Please note this is an example timetable and will vary for every student. Students should anticipate lessons starting earlier than 9am or later than 5pm. Students will be expected to allocate self study and revision hours within their timetable which will be given at the start of the academic term.

	9-10	10-11	11-12	12-1	1-2	2-3	3-4	4-5
Mon	English	English		Lunch		Pure Mathematics	Pure Mathematics	
Tues		Physics	Physics	Lunch	English	English		Personal Tutorial
Wed	Pure Mathematics	English	English	Lunch	Skills for Science			
Thur		Physics	Physics	Lunch			Pure Mathematics	Pure Mathematics
Fri	Skills for Science	Skills for Science	Pure Mathematics	Lunch	Physics	Physics		

For more information visit:

www.oncampus.global