



Department of Computer Science and
Information Systems

Postgraduate Certificate in
Applied Data Science
2020-2021

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1 General Information

1.1 Contacts

Programme Director:	Stelios Sotiriadis, stelios@dcs.bbk.ac.uk
Programme Administrator:	Elia Ntaousani cs-pgcert@bbk.ac.uk
Admissions Tutor:	Stelios Sotiriadis, stelios@dcs.bbk.ac.uk
Projects Tutors:	Stelios Sotiriadis, stelios@dcs.bbk.ac.uk Mark Levene, mark@dcs.bbk.ac.uk Peter Wood, p.wood@dcs.bbk.ac.uk Martyn Harris, martyn@dcs.bbk.ac.uk

1.2 Web presence

Detailed and updated information about the programme is available from the

- Programme internet page: <https://www.dcs.bbk.ac.uk/study/postgraduate/pgcert-in-applied-data-science/>
- Department internet page for current students:
<https://www.dcs.bbk.ac.uk/intranet/>
- Moodle page (for enrolled students);
 - Demystifying Computing with Python: <https://www.dcs.bbk.ac.uk/study/modules/demystifying-computing-with-python/>
 - Analytic Tools for Data Science <https://www.dcs.bbk.ac.uk/study/modules/analytic-tools-for-data-science/>
 - PGCert Applied Data Science Project <https://www.dcs.bbk.ac.uk/study/modules/pgcert-applied-data-science-project/>

It is your responsibility to familiarise yourself with the contents of both of this booklet as well as the internet pages of the programme. You should also read your college email on a regular basis.

2 Student Support

Every student is allocated a personal tutor in the first weeks of the programme. The personal tutor is someone students can contact to discuss any problems of a non-academic nature. These may relate to special needs or personal problems that may affect the student's academic performance. The Department also has a disability officer whom students can contact.

Academic problems should first be addressed to the lecturer concerned. If the problem is not resolved or it does not relate to a specific module, then the Programme Director should be contacted.

For more general information about Birkbeck, student services and regulations have a look at

<http://www.bbk.ac.uk/student-services>.

It is expected that students familiarise themselves with these pages so that they are aware of the services and regulations.

The School of Business, Economics and Informatics has Learning Co-ordinators. Their role is to support students in their studies. They can offer help and support on a variety of topics ranging from writing skills to basic maths. See

<http://www.bbk.ac.uk/business/current-students/learning-co-ordinators>

for details.

3 Important Dates

Lectures will commence in the week starting on Monday 11 January 2020. The teaching (i.e., not including exams and project) covers two terms of eleven weeks each (autumn and spring term). The summer term is given over to work on the PGCert Applied Data Science Project. The revision lecture date and the exams will be after the end of the Spring term.

- Autumn term: Monday 5 October 2020 to Friday 18 December 2020.
- Spring term: Monday 11 January 2021 to Friday 26 March 2021.
- Summer term: Monday 26 April 2021 to Friday 9 July 2021.

Please refer to

<http://www.bbk.ac.uk/about-us/term-dates>

for the College holiday closing times.

Students should attend lectures during term time as shown in the timetables in Section 4.3. If students are unable to attend lectures, they should arrange with lecturers or fellow-students to obtain copies of any material distributed in class.

Any student who decides to withdraw from the programme should inform the Programme Administrator. Students who simply stop turning up for lectures without formally withdrawing from the programme will still be held liable for fees. It is especially important for international students that they inform the department about any absence.

4 Syllabus

4.1 Introductory Talks

The programme will kick off with introductory talks to new students in the week preceding the start of the spring term. The dates, times and venues of these will be made available through My Birkbeck. The talks will include a hands-on introduction to the departmental computer systems and short presentations by representatives of the library and the disability office.

4.2 List of Modules

We give a general overview of the content of the programme here; detailed descriptions of the individual modules are to be found in the next section.

4.2.1 Compulsory Modules

- Demystifying Computing with Python (15 credits)
- Analytic Tools for Data Science (15 credits)
- PGCert Applied Data Science Project (30 credits)

4.3 Timetables

Personal timetables (including the teaching venues) are provided through My Birkbeck. A general timetable for the week ahead is available online:

<https://cis.bbk.ac.uk/apex/a02u/deptt.show?d=BUCI>

Below is the timetable for the modules. Note that occasionally there might be changes (e.g. swapping of lectures between modules, or additional tutoring sessions). Please check the web pages of the modules regularly for up-to-date information.

Demystifying Computing with Python

- The module will be delivered from **week 1 to week 5**.
- Classes will be every Tuesday and Thursday 18:00-21:00. For more details, please refer to the Birkbeck timetable.

Analytic Tools for Data Science

- The module will be delivered from **week 6 to week 11**.
- Classes will be every Tuesday and Thursday 18:00-21:00. For more details, please refer to the Birkbeck timetable.

PGCert Applied Data Science Project

- The module will be delivered in the **summer term**.
- There will be one briefing session (Tuesday 18:00-21:00) delivered on the first week of the summer term. This module will conclude with the submission of an applied data science project.

5 Compulsory Module Descriptions

5.1 Demystifying Computing with Python

Teaching Staff

Stelios Sotiradis

Online material

<https://moodle.bbk.ac.uk/course/view.php?id=31677>

Aims

The module provides an opportunity to learn programming with Python, including developing simple programs, working with numbers, decision structures, loops, data structures and functions. The module will introduce the area of applied data analytics using data sources such as text or csv files., and the use of SQL for interacting with databases.

The learning outcomes include:

- Understand the concepts of algorithms using the Python programming language.
- Reframe an organisational challenge as an analytics challenge.
- Develop computational thinking skills in order to specify algorithms necessary for problem solving.
- Learn how to deal with different data formats and data sources (e.g., text, csv).
- Apply appropriate data structures to design basic software requirements.
- Develop understanding of databases and use of structure query language (SQL).

Syllabus

- Computational thinking and algorithms
- Computing with numbers
- Decision structures and loops
- Data structures with Python
- Developing data science programs for analytics
- Introduction to SQL
- Designing a database system using SQL
- Case studies to introduce data analytics with Python

Prerequisites

No prerequisites.

Assessment

By a 2-hour written examination and a coursework, weighting 80% and 20%, respectively.

Reading

- J. Zelle, Python Programming: An Introduction to Computer Science 3rd Revised edition, 8 Aug 2016
- Z. Shaw, Learn Python 3 the Hard Way: A Very Simple Introduction to the Terrifyingly Beautiful World of Computers and Code (Zed Shaw's Hard Way) Paperback, 27 Jun 2017
- J. Grus, Data Science from Scratch – First principles with Python (2nd ed.). O'Reilly, 2019.

5.2 Analytic Tools for Data Science

Teaching Staff

Stelios Sotiradis

Online material

<https://moodle.bbk.ac.uk/course/view.php?id=31789>

Aims

This module covers the fundamental concepts and techniques of applied data science with Python, demonstrating how to apply these in order to process and visualise datasets. The module will cover tools such as dataframes, data analytic techniques using machine learning models and use of Python libraries for data science. During the labs, students will work on case studies to apply data analytics to real-world problems. On successful completion of this module a student will be expected to be able to:

- Demonstrate satisfactory knowledge of data analytics using the Python programming language.
- Understand techniques for data cleaning and processing.
- Use Python to apply machine learning techniques (supervised/unsupervised) to real-world problems.
- Retrieve data from data sources for analysis, processing and visualisations.
- Understand the latest libraries used for data science such as Scikit-learn.

Syllabus

- Introduction to machine learning and data analytics
- Python libraries such as Pandas, Matplotlib and Scikit learn
- Developing programs for statistics and probabilities with Python

- Data cleaning methods and processing methods
- Introduction to machine learning with Python
- Understand how different machine models work
- Classification and Regression with Python
- Introduction to natural language processing
- Introduction to big data analytics

Prerequisites

Module 1: Demystifying Computing with Python

Assessment

By a 2-hour written examination and a coursework, weighting 80% and 20%, respectively.

Reading

- A. Geron, Hands-On Machine Learning with Scikit-Learn and TensorFlow, O'Reilly, 2017

5.3 PGCert Applied Data Science Project

Teaching Staff

Stelios Sotiradis

Online material

<https://moodle.bbk.ac.uk/course/view.php?id=31658>

Aims

For the PGCert Applied Data Science Project, each student is required to undertake an individual work-based project, under the supervision of a member of staff from Birkbeck. The project will allow students to demonstrate their skills in organising and completing a substantial task in the area of computing, starting from requirements analysis and planning to development and implementation of the project. The main aims of the work-based project are to offer students the opportunity to:

- Develop a systematic understanding and critical awareness of a commonly agreed problem between the work environment and the academic supervisor in the area of computing.
- Develop a software solution for a work-based problem using the skills developed from the taught modules, for example develop software using the programming languages and software tools/libraries taught.
- Present a critical discussion on existing approaches in the particular problem area and position their own approach within that area and evaluate their contribution.
- Gain experience in communicating complex ideas/concepts and approaches/techniques to others by writing a comprehensive, self-contained report.

Syllabus

The main part of this module will be completed by the student on their own. There is a small taught component of the module in which students are acquainted with:

- How to formulate the objectives and aims of a project.
- How to write a project proposal relevant to a work-based project.
- How to organise and plan the project according to clearly defined requirements.
- How to undertake a literature review.
- How to write a project report.

Prerequisites

- Demystifying Computing with Python
- Analytic Tools for Data Science

Assessment

- By a written project (20% of the overall mark) proposal of 1500 words (+/- 10%).
- By a software solution and a report (80% of the overall mark) to demonstrate technical and computational skills based on modules taught (using programming and available tools to implement the work-based project. Students will require to submit a software and a report of 6000-8000 words (+/- 10%).

6 Administration and Assessment

For detailed College rules and regulations see

<http://www.bbk.ac.uk/mybirkbeck/services/rules>

Below we summarise the most relevant rules for the PGCert in Applied Data Science.

6.1 Requirements for the Award of the PGCert

Modules Demystifying Computing with Python and Analytic Tools for Data Science are assessed by a coursework and a written exam. On top of that, there is a 30-credit project module which is assessed by the project proposal document (20%) and the project report (80%).

In the current arrangement each taught module gives 15 credits. For each module, a Pass requires at least 50% of the available marks (computed according to the corresponding weights of the parts of the assessment). College regulations do not allow compensations for PGDip nor PGCert.

To gain an award, the following is required:

- Postgraduate Certificate (PGCert): a candidate must pass two 15-credit modules (Modules Demystifying Computing with Python and Analytic Tools for Data Science) and one 30-credit module (PGCert Applied Data Science Project).

The final grade is computed by taking the weighted average (according to the credits) of the module assessment marks. The following has to be satisfied:

- Pass requires at least a 50% weighted average pass mark
- Merit requires at least a 60% weighted average pass mark
- *Distinction requires at least a 70% weighted average pass mark¹.*

¹Following new college regulations, this requirement has been amended in the 2019-20 edition of the handbook.

6.2 Announcement of Results

The Examination Board meets after the end of the summer to consider the results of the written exams, coursework, and to consider the results of the projects and to award degree.

Shortly after the meeting of the exam board you will receive a letter from the Department about your results. Your results and grades will be officially confirmed by the College on your MyBirkbeck profile.

Students who have not paid their fees won't be served any information about their examination results.

6.3 Mitigating Circumstances and Deferral

A Mitigating Circumstances claim should be submitted if valid detrimental circumstances result in:

- the late or non-submission of assessment;
- non-attendance of examination;
- poor performance in assessment.

If a student feels their circumstances warrant consideration by the Board of Examiners they should notify the Programme Director, in writing, in advance, at the earliest opportunity (within 7 days of the assessment deadline or examination) using a *Mitigating Circumstances Claim Form*, which can be downloaded from MyBirkbeck or from:

[http://www.bbk.ac.uk/downloads/registry/policies-2020-21/
mitigating-circumstances-policy-and-procedure.pdf](http://www.bbk.ac.uk/downloads/registry/policies-2020-21/mitigating-circumstances-policy-and-procedure.pdf)

In the form, students should state whether the circumstances relate to non-attendance at an examination or late submission of an assignment and should include supporting evidence (e.g., a medical certificate giving the nature and duration of any illness). Students should be aware that discussing their claim with a member of staff does not constitute a submission of a claim of mitigating circumstances.

For a claim to be accepted a student must produce independent documentary evidence to show that the circumstances:

- have detrimentally affected their performance/submission/attendance in assessment or will do so;
- were unforeseen;
- were out of their control and could not have been prevented;
- relate directly to the timing of the assessment affected.

For further information, students may consult the document on mitigating circumstances through MyBirkbeck:

<http://www.bbk.ac.uk/downloads/registry/policies-2020-21/mitigating-circumstances-policy-and-procedure.pdf>

In exceptional cases, students may be permitted to defer the written exams *to the next available period*² and/or the project to the following year. They must apply by filling in a Mitigating Circumstances Claim Form and submitting it to the PGCert administrator. Students have to do this before **May 1st** for exams and by **September 1st** for the project.

A student who defers an element of assessment normally has to enter for that element *at the next available opportunity*³. No further deferrals are usually permitted. Simply not turning up for an exam or failing to submit a coursework or project, without permission to defer, will be considered to be the same as failing it, in the sense that it will count as one of the two attempts that you are permitted to make at passing that element.

6.4 Retake and Reassessment

Retake and reassessment are defined as follows (from the 2018-19 handbook):

One reassessment (but only one) is allowed for each element. You may be reassessed in a failed coursework, written exam or the project if your marks for that module are below 50%. If your marks are below 40%, then you have to retake the whole module

²Following new college regulations, this requirement has been amended in the 2019-20 edition of the handbook.

³Following new college regulations, this requirement has been amended in the 2019-20 edition of the handbook.

(i.e., attend lectures and be reassessed in each element of the module, including coursework and exam).

Students who fail an assessment and awarded a reassessment opportunity have their reassessment subject to a cap of 50% for the reassessed element. The cap does not apply to a retake of a whole module and to students with accepted mitigating circumstances.

There are no special resit exams; students resit alongside the other candidates in May/June the following year. They normally do so a year after their first attempt. Where the syllabus has changed, we set a paper that is suitable for resit candidates, providing alternative questions where necessary. Note, however, that we do this only for candidates from the previous year, not from further in the past.

Also note that part-time students normally need to accumulate at least 45 credits (out of the available 75) in their first year in order to progress into the second year. Students who do not achieve this will not be able to complete their studies in two years. Instead they will have to spend at least one year as a repeating student, retaking the failed modules.

Under normal circumstances this would take place the following year and students would not be allowed to take any new modules until they had passed the failed modules.

6.5 New re-assessment policy

The following rules are entering into force during the Academic year 2020-21. Their working and implementation might vary during the year; students are invited to check with the PGCert administrator.

Reassessment takes place over the summer, with exams taking place in August and September.

For students who do not take the summer reassessment exam (perhaps because of accepted mitigating circumstances) and where the syllabus for the next year has changed, we set a paper that is suitable for resit candidates, providing alternative questions where necessary. Note, however, that this procedure is available to candidates from the previous year, not from further in the past.

6.6 Re-enrolment

Repeat students, i.e., students who have to retake some modules (and are not taking any new modules) will be charged pro-rata based on the number of credits they retake.

Assessment only students, i.e., those who

- are being reassessed for coursework and/or examinations only
- have deferred their examinations and are not taking any new modules
- have deferred the project and do not require supervision (resubmitting only)

pay a reduced fee that will allow them access to College facilities (Library and workstation rooms). While deferred students are classed as assessment only they are allowed to attend lectures for revision purposes. They should formally seek the permission of module tutors to ensure classes are not over-subscribed.

PGCert Applied Data Science Project only students, i.e. students who retake the project with supervision, pay one third of full fees. Note that

- a student who has to resubmit the dissertation and be reassessed for examination or coursework will be progressed as dissertation only
- a student who has to resubmit the dissertation and also repeat modules will be progressed as repeat and fees are based pro-rata on the number of credits.

6.7 Examinations

Please consult the programme's intranet web page (for enrolled students).

- Exams for **Demystifying Computing with Python** and **Analytic Tools for Data Science** will be at the beginning of the Summer term.

6.8 Coursework

Demystifying Computing with Python and **Analytic Tools for Data Science** modules require students to submit coursework as part of the assessment. Please consult the web page of the relevant module or contact the teaching staff of the module for particular details.

Submitted coursework must always be the students' own work, except where explicitly noted. Students are required to confirm (normally via the Moodle upload interface) that each item of coursework submitted is indeed their own work.

The Department and College have strict guidelines and penalties associated with plagiarism, and routinely submit students' work to plagiarism detection services. More details are given in the section "Assessment Offences and Plagiarism" of this booklet.

College policy dictates how Schools will treat work that is due for assessment but is submitted after the published deadline. Any work that is submitted for formal assessment after the published deadline but before the cut-off date (normally ten working days after the deadline) is given two marks: a penalty mark of 50% for postgraduate students, assuming it is of a pass standard, and the 'real' mark that would have been awarded if the work had not been late.

Both marks are given to the student on a cover sheet. If the work is not of a pass standard a single mark is given.

If you submit late work that is to be considered for assessment, then you should submit a mitigating circumstances form, see above, and provide written documentation, medical or otherwise, to explain why the work was submitted late. The case will then be considered by the appropriate sub-board or delegated panel of the Board of Examiners.

If no case is made then the penalty mark will stand. If the case is made and accepted then the examination board may allow the 'real' mark to stand.

6.9 Assessment Offences and Plagiarism

Please see at MyBirkbeck

[http:](http://www.bbk.ac.uk/student-services/exams/assessment-offences)

[//www.bbk.ac.uk/student-services/exams/assessment-offences](http://www.bbk.ac.uk/student-services/exams/assessment-offences)

for the College Policy on Assessment Offences.

One particular assessment offence is *plagiarism* that is defined as

“[...] copying a whole or substantial parts of a paper from a source text (e.g., a web site, journal article, book or encyclopedia), without proper acknowledgement; paraphrasing of another’s piece of work closely, with minor changes but with the essential meaning, form and/or progression of ideas maintained; piecing together sections of the work of others into a new whole; procuring a paper from a company or essay bank (including Internet sites); submitting another student’s work, with or without that student’s knowledge; submitting a paper written by someone else (e.g., a peer or relative), and passing it off as one’s own; representing a piece of joint or group work as one’s own.”

Also,

“[a] student who knowingly assists another student to plagiarise (for example by willingly giving them their own work to copy from) is committing an examination offence.”

The College considers plagiarism a serious offence, and as such it warrants disciplinary action. This is particularly important in assessed pieces of work where plagiarism goes so far as to dishonestly claim credit for ideas that have been taken by someone else.

The College also provides learning support for exams and assessments, please see

<http://www.bbk.ac.uk/student-services/learning-development>

and guidelines on plagiarism

<http://www.bbk.ac.uk/student-services/exams/plagiarism-guidelines>

7 Student Services

The College provides various services to students, see:

<http://www.bbk.ac.uk/student-services>

In particular, there are the Counselling Service, the Disability and Dyslexia Service, and the Mental Health Service. They provide specialist support to students.

7.1 Counselling Service

The Counselling Service

<http://www.bbk.ac.uk/student-services/counselling-service>

provides assistance to students who are experiencing emotional difficulties which may be impacting upon their studies or overall experience at Birkbeck.

7.2 Mental Health Service

Many students experience mental health difficulties at some point in their time at university. Whether you have a formally diagnosed psychiatric condition or other form of mental health difficulty such as anxiety or depression, we encourage you to seek support in your studies. Birkbeck's Mental Health Service

<http://www.bbk.ac.uk/student-services/mental-health-advisory-service>

is a first point of contact for students experiencing mental health issues at any stage during their studies.

7.3 Disability and Dyslexia Service

At Birkbeck we welcome students with disabilities. We aim to provide all of our students with a study environment that enables them to participate fully in our courses.

The Disability and Dyslexia Service:

<http://www.bbk.ac.uk/student-services/disability-service>

can provide advice and support to students with conditions that impact their ability to study, such as:

- specific learning difficulties (dyslexia, dyspraxia, dyscalculia, AD(H)D)
- sensory impairments (blind/partially sighted, deaf/hearing impaired)
- mobility conditions (including RSI, arthritis, neck back and knee conditions etc.)
- medical conditions (e.g. HIV, CFS, diabetes, cancer, chest and respiratory conditions etc.)
- autism-spectrum conditions (autism or Asperger's syndrome)

They can provide support during your studies including

- Your Study Support Plan
- The Disabled Students' Allowance
- Access to Learning Fund
- Charities and trusts
- Dyslexia screening test
- Government benefits
- Personal emergency evacuation plans
- Pager alert system
- Rest Room
- Toilet facilities
- Car parking
- Disability and Dyslexia Support in the Library and IT Services

8 Career Development

Most students are interested in developing their careers, either within their current field of work or in a completely new direction. The Careers Group, University of London

<http://www.thecareersgroup.co.uk/>

offers great expertise and experience in working with students and graduates of all ages and at all stages of career development.

The Careers and Employability Service

<http://www.bbk.ac.uk/careers/careers-service>

is our in-house service for enhancing career development and employability throughout your time at Birkbeck, from enrolment through to graduation.

There is also Birkbeck Talent, a professional recruitment service aimed exclusively at assisting Birkbeck students to find work whilst studying and after graduation. They work with top employers in and outside London to offer innovative internships, prestigious job vacancies and exciting graduate opportunities. To find out more please visit

<http://www.bbk.ac.uk/student-services/birkbeck-talent-service>

9 The Business Engagement Team

The School of Business, Economics and Informatics has a dedicated Business Engagement team to provide you with extra support. The team delivers the following initiatives to support you in your career aspirations:

9.1 Mentoring Pathways

Mentoring Pathways pairs successful applicants with industry professionals for individual advice and guidance. There are a number of places available for final year undergraduates and postgraduate students. We have partnerships with a number of key organisations and work alongside Birkbeck alumni who provide mentors. Applications open in the autumn. Please email mentoring@bbk.ac.uk or visit

<http://www.bbk.ac.uk/business-services>

for more information.

9.2 Enterprise Pathways

Whether you are setting out in your journey as an entrepreneur or have already established a thriving business, we offer various pathways to support you. These include a non-credit bearing module with workshops once a month throughout the academic year, access to digital resources, enterprise boot camps and inspirational talks to help you to develop your ideas and network with other students. Please email enterprise@bbk.ac.uk or visit <http://www.bbk.ac.uk/student-services/enterprise-pathways>.

9.3 Keeping in Touch

You can also follow BEI on social media for information and conversations:

- Twitter: @BirkbeckBEI
- Facebook, Google+ and LinkedIn: Search 'BirkbeckBEI'

Please visit our website

www.bbk.ac.uk/business/business-services

for more resources and information.