Department of Computer Science and Information Systems

MSc in Computer Science Programme Arrangements 2020–2021

Version of September 1, 2020
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1 General Information

1.1 Contacts

Programme Director: Szabolcs Mikulás, szabolcs@dcs.bbk.ac.uk
Programme Administrators: Kat Miao Yu, Stacey Hine, pg@dcs.bbk.ac.uk
Admissions Tutor: Carsten Fuhs, carsten@dcs.bbk.ac.uk
Projects Tutor: Oded Lachish, oded@dcs.bbk.ac.uk

1.2 Web presence

Detailed and updated information about the programme is available from the

- programme internet page:
  www.dcs.bbk.ac.uk/study/postgraduate/msc-computer-science/

- Departmental Moodle page (for enrolled students):
  https://moodle.bbk.ac.uk/course/view.php?id=3884

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

https://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 5 October 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 revision (including revision lectures), exams, and the project.

- 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(s). 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 first term. The dates, times and venues of these will be made available through My Birkbeck. They are also mentioned at http://www.bbk.ac.uk/events/?tag=7.

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 is in the next section.

4.2.1 Compulsory Modules

- Principles of Programming I — PoP I (15 credits)
- Principles of Programming II — PoP II (15 credits)
- Fundamentals of Computing — FoC (15 credits)
- Information Systems — IS (15 credits)
- Computer Systems — CS (15 credits)
- Data and Knowledge Management — DKM (15 credits)
- Software Design and Programming — SDP (15 credits)
- MSc Computer Science Project (60 credits)

4.2.2 Optional Modules

Students also have to choose one optional module from the following list.

- Advances in Data Management — ADM (15 credits)
- Information and Network Security — INS (15 credits)
- Internet and Web Technologies — IWT (15 credits)
• Natural Language Processing and Information Retrieval — NLP (15 credits)

Optional module availability is subject to timetabling constraints and student demand. In the event that an optional module is over-subscribed, available places will be allocated on a first-come, first-served basis determined by the date you return your module choice form to the Programme Administrator.

4.3 Timetables

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

http://www.dcs.bbk.ac.uk/study/

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.

4.3.1 Part-time Students Year 1

In the first year PT students take only compulsory modules as follows.

<table>
<thead>
<tr>
<th>First year</th>
<th>Term 1 (Autumn)</th>
<th>18:00–19:20</th>
<th>19:40–21:00</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mon</td>
<td>PoP I</td>
<td>PoP I</td>
</tr>
<tr>
<td></td>
<td>Wed</td>
<td>FoC</td>
<td>IS</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>First year</th>
<th>Term 2 (Spring)</th>
<th>18:00–19:20</th>
<th>19:40–21:00</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mon</td>
<td>PoP II</td>
<td>PoP II</td>
</tr>
<tr>
<td></td>
<td>Wed</td>
<td>IS</td>
<td>FoC</td>
</tr>
<tr>
<td></td>
<td>Thu</td>
<td>CS</td>
<td>CS</td>
</tr>
</tbody>
</table>
4.3.2 Part-time Students Year 2

In the second year PT students follow the compulsory modules below, and also one optional module — see Section 4.3.5 below.

<table>
<thead>
<tr>
<th>Term 1 (Autumn)</th>
<th>18:00–19:20</th>
<th>19:40–21:00</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thu</td>
<td>DKM</td>
<td>DKM</td>
</tr>
</tbody>
</table>

Second year

<table>
<thead>
<tr>
<th>Term 2 (Spring)</th>
<th>18:00–19:20</th>
<th>19:40–21:00</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thu</td>
<td>SDP</td>
<td>SDP</td>
</tr>
</tbody>
</table>

Additionally, in this year, there will be MSc project briefing sessions. The dates, times and venues of these will be made available through My Birkbeck and at http://www.bbk.ac.uk/events/?tag=7.

4.3.3 Full-time Students

FT students follow the compulsory modules below, and also one optional module — see Section 4.3.5 below.

<table>
<thead>
<tr>
<th>Term 1 (Autumn)</th>
<th>13:30–15:00</th>
<th>15:30–17:00</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mon</td>
<td>PoP</td>
<td>PoP</td>
</tr>
<tr>
<td>Tue</td>
<td>DKM</td>
<td>DKM</td>
</tr>
<tr>
<td>Wed</td>
<td>PoP</td>
<td>PoP</td>
</tr>
<tr>
<td>Thu</td>
<td>IS</td>
<td>FoC</td>
</tr>
<tr>
<td>Fri, 3rd week only</td>
<td>MSc Project</td>
<td>MSc Project</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Term 2 (Spring)</th>
<th>13:30–15:00</th>
<th>15:30–17:00</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tue</td>
<td>SDP</td>
<td>SDP</td>
</tr>
<tr>
<td>Wed</td>
<td>CS</td>
<td>CS</td>
</tr>
<tr>
<td>Thu</td>
<td>IS</td>
<td>FoC</td>
</tr>
</tbody>
</table>

Additionally, there will be MSc project briefing sessions. The dates, times and venues of these will be made available through My Birkbeck and at http://www.bbk.ac.uk/events/?tag=7.
4.3.4 Day-release Part-time Students

Day-release part-time students attend lectures with the full-time students for one day of the week and attend the other lectures with the part-time students during the evening.

<table>
<thead>
<tr>
<th>First year</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Mon 18:00–21:00</td>
<td>PoP</td>
</tr>
<tr>
<td>Thu 13:30–17:00 (term 1)</td>
<td>IS, FoC</td>
</tr>
<tr>
<td>Thu 13:30–21:00 (term 2)</td>
<td>IS, FoC, CS</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Second year</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Tue 13:30–17:00 (term 1)</td>
<td>DKM</td>
</tr>
<tr>
<td>Tue 13:30–17:00 (term 2)</td>
<td>SDP</td>
</tr>
</tbody>
</table>

Alternatively, students can attend the lectures in any combination of the tables above as long as all modules are attended in the correct year (PoP I and II, FoC, IS, and CS in year 1 and the remaining modules in year 2). Additionally, in the second year, there will be MSc project briefing sessions. The dates, times and venues of these will be made available through My Birkbeck and at http://www.bbk.ac.uk/events/?tag=7.

4.3.5 Optional Modules

Here are the times for the optional modules. You have to choose only one of them.

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Mon 18:00–21:00 (term 1)</td>
<td>INS</td>
</tr>
<tr>
<td>Tue 18:00–21:00 (term 2)</td>
<td>NLP, IWT</td>
</tr>
<tr>
<td>Mon 18:00–21:00(^1) (term 2)</td>
<td>ADM</td>
</tr>
</tbody>
</table>

\(^1\)for FT students ADM labs precede lectures and start between 13:30 and 16:00
5 Compulsory Module Descriptions

5.1 Principles of Programming I (PoP I)

Teaching Staff

Vladislav Ryzhikov, Hubie Chen

Online material

On Moodle.

Aims, Outline and Learning Outcomes

To provide the student with a comprehensive grounding in programming. This module introduces programming concepts and techniques, as well as elementary software development principles. Both for absolute beginners and for those with prior programming experience, the module introduces the fundamentals of programming, including: variables and assignment, primitive and complex types, methods, control structures, collections, iteration, recursion, as well as classes and objects in object-oriented programming. The module also introduces basic software development issues such as design, testing, debugging.

On successful completion of this module a student will be expected to be able to:

• Demonstrate knowledge of fundamental imperative programming concepts such as variables and assignment, conditional statements, loops and methods.

• Code an application in a suitable programming language, from a detailed software specification.

• Evidence knowledge of basic concepts and principles of object-orientation such as objects and classes, encapsulation, object state, coupling, cohesion and modularity.

• Show awareness of basic principles of software design and development including appropriate naming of variables and classes, code layout, testing, debugging, and code version control.

Syllabus

• Core imperative programming ideas: sequence, iteration, assignment, and variables
• Data types
• Collection Data Structures: Arrays, List, Sets, Dictionaries
• Functions
• Version Control
• Automated testing and test-driven development (TDD)
• Object-oriented programming: Encapsulation, Inheritance, Polymorphism
• Functional programming features of Python
• Dynamic data structures: Linked lists, Queues, and Stacks
• Recursion
• Exception handling

Prerequisites
A pass in the relevant admissions test.

Assessment
By examination (80%) and programming coursework (20%). The examination is split into two parts; 1) 40% via an online programming exam, and 2) 40% via a written exam.

Reading
A set of course notes will be provided but the following text covers similar topics:

5.2 Principles of Programming II (PoP II)

Teaching Staff
Hubie Chen

Online material
On Moodle.

Aims and Learning Outcomes
This module covers object-oriented programming using the Java programming language, including the use of subclasses, modules, and library classes to create well-organised programs. A further aim is to enhance student’s understanding of making appropriate choices on the selection of algorithms, their implementation together with the required data structures (e.g. arrays, lists, trees, graphs, depth- and breadth-first search algorithms).

This module further develops the techniques described in the “Principles of Programming I” module. This module discusses issues specifically related to developing programs for large programming projects and for modern computer hardware architectures.

On successful completion of this module a student will be expected to be able to:

- Explain and exploit subclasses, inheritance and interfaces to produce modular, well-organised code.
- To utilise the relevant features of a programming language.
- Implement simple algorithms and data structures, both in sequential and parallel environments.
- Show knowledge of basic concepts and principles of object-orientation such as objects and classes, encapsulation, object state, coupling, cohesion and modularity.

Syllabus
- Data types in Java
- Control flow in Java
- Transition to Object-Oriented Programming, including types, classes, inheritance, etc.
• Static typing and reference types
• Local I/O
• Exception handling
• Generics
• Multithreaded programming
• Style
• Further test driven development
• Programming in teams

Prerequisites
Principles of Programming I module.

Assessment
This module is assessed by

• Two-hour unseen examination – online or paper (80%)
• Programming assignments and group work (20%)

Reading
Materials will be provided by the instructor; the following text is recommended as a reference:

5.3 Fundamentals of Computing (FoC)

Teaching Staff
Michael Zakharyaschev (module coordinator), Trevor Fenner

Aims
Discrete mathematics, mathematical logic, and the related fundamental areas of data structures and algorithms lie at the heart of any modern study of Computer Science. Any understanding of how computers operate and how to use them effectively and efficiently, in terms of either their hardware or software, inevitably involves numerous mathematical concepts.

Syllabus
- Digital logic. Arithmetic for computers.
- Elements of set theory.
- Finite state machines (automata). Nondeterministic automata.
- Regular languages.
- Context-free languages and pushdown automata.
- Data structures: representations and operations.
- Lists, stacks, queues and dequesues.
- Trees, forests, binary trees.
- Tree traversal and other operations; binary search trees.
- Organisation of disk storage; methods of file organisation; B-trees.
- Design and analysis of algorithms. Sorting and searching.

Prerequisites
Students taking this module must be also be currently taking (or have previously taken) a suitable programming module (Principles of Programming, or Introduction to Software Development). With the permission of the Programme Director, other students may take this module if they have equivalent appropriate programming experience.

Assessment
By 3-hour written examination and coursework exercises, weighting 80% and 20% respectively.
**Reading**


**Online material**

http://www.dcs.bbk.ac.uk/~michael/foc/foc.html

http://www.dcs.bbk.ac.uk/~trevor/FoC/focTF2018.html
5.4 Information Systems (IS)

Teaching Staff
Brian Gannon

Aims
The primary aim of the module is to describe enterprise information systems (EIS) and to set out the considerations and approaches used to implement (deploy) these systems in the business enterprise. This covers predominantly the Systems Development Life Cycle (SDLC) and the various methodologies used to formalise it, including waterfall and agile approaches, with particular emphasis on the Scrum method. In the course of this module students are introduced to a range of topics relevant to EIS deployment and the SDLC, including object-orientation, the Unified Process and Universal Modelling Language (UML), enterprise architecture and technical architecture.

Alongside describing the SDLC, students will be introduced to practical aspects associated with a career as an IS professional, and social and organisational aspects of enterprise computing. This will include topics such as Intellectual Property, Digital Surveillance, Data Privacy and Ethical issues in computing.

Outline
The module describes approaches, processes, methodologies and techniques commonly used for large-scale information systems development. It covers the systems development life cycle (SDLC), including project initiation, analysis, design and implementation, addressing key aspects and techniques at each stage. Project methodologies are described, with an emphasis on the Scrum methodology. The module also incorporates insights into professional and legal issues associated with EIS development.

Syllabus
- Introduction to Enterprise Information Systems (EIS)
- SDLC, IS project methodologies and the Unified Process
- Unified Process – Planning & Analysis
- Scrum I – Process, Roles, Activities & Ceremonies
- Scrum II – Artefacts & Concepts
• Enterprise Architecture & Technical Architecture;
• EIS Implementation and Operation;
• GDPR, Freedom of Information & Intellectual Property Rights, Contracts & Business Planning, and

Assessment
By a 2-hour unseen written examination and in-class tests, weighting 80% and 20% respectively.

Recommended Reading
Multiple sources including various academic papers. Also, various textbooks including:

• Essential SCRUM, Rubin, Addison Wesley, NJ 2013.
• Systems Analysis and Design with UML, Tegarden, Dennis, & Wixom, 5th edition, Wiley.

Online Material
https://moodle.bbk.ac.uk/
5.5 Computer Systems (CS)

Teaching Staff

Jan Hidders

Aims

To learn the basics of computer architecture and organisation, and the role and mechanism of operating systems.

Syllabus

- Introduction: Computer architecture (CA) and Operating system (OS) overview
- Processors
- Processes and threads
- Concurrency
- Memory management
- I/O and file systems
- Protection and security
- Distributed and parallel processing

Prerequisites

MSc IT students who wish to enrol to this module are expected to pass the test for the short course.

Assessment

By 2-hour written examination and coursework, weighting 90% and 10%, respectively.

Reading

Textbook:


Recommended reading:

Online material

http://www.dcs.bbk.ac.uk/~szabolcs/compsys.html
5.6 Data and Knowledge Management (DKM)

Teaching Staff

Richard Brownlow

Online material

http://www.dcs.bbk.ac.uk/~nigel/teaching/dkm/

Aims and Outline

To study the principles and application of data and knowledge management technology.

This module covers the principles and application of data and knowledge management technologies and languages including SQL. Students study the use of these in leading commercial database management systems as well as emerging approaches to data management.

Syllabus

- Database management software: origins and objectives.
- The relational model: algebraic and logical foundations.
- Relational algebra and calculus.
- SQL: data manipulation, host language support for SQL.
- Transaction management: recovery, concurrency.
- Relational database theory: dependencies, normal forms.
- SQL data definition, other features.
- DBMS architectures and implementations.
- DBMS storage and indexing.
- Query optimisation.
- Enhanced database capabilities: procedural extensions to SQL, database triggers, deductive databases.
- Non-relational DBMS, object databases, NoSQL databases.
- Distributed databases, architectures, query processing.
- Databases and the Web, JDBC, alternative persistence frameworks, databases and XML.
- Database research topics.
Assessment

By 2-hour written examination and practical coursework, weighting 90% and 10% respectively.

Pre-requisites and co-requisites to the module

No formal pre-requisite, but a strong aptitude for programming is essential.

Reading

- Students will also be directed to Web resources on the subject.
5.7 Software Design and Programming (SDP)

Teaching Staff
Keith Mannock

Online material
http://moodle.bbk.ac.uk/

Aims
The main aim of the module is to provide students with the necessary skills for developing software utilising the object-oriented and functional programming paradigms utilising the Java programming language.

Syllabus
A selection from the following topics:

- The object model and how it is realised in various object-oriented languages (e.g., Java, Scala, Ruby, C++, ...)

- Further development the ideas of inheritance and polymorphism and abstraction

- Language features: inner classes, closures, higher-order functions, metabojects, etc.


- An introduction to Test Driven Design (TDD) and Behavioural Driven Design (BDD)

- The use of an Integrated Development Environment (IDE) for software development: e.g., editing, debugging, compilation, etc.

- Modularity, versioning, packaging, and managing the build process

- Design Patterns and Anti-Patterns and their application to software design
- The SOLID (Single responsibility, Open-closed, Liskov substitution, Interface segregation and Dependency inversion) approach to object oriented programming and design

- Code refactoring and analysis

- Concurrency and agents/actors

Please note that the materials for this module are presented using a combination of blended learning techniques together with the inverse curriculum approach to teaching.

**Prerequisites**

Introduction to Software Development with a distinction level grade, or Principles of Programming I and II, or an appropriate level of experience with a modern programming language otherwise (requires approval by the module leader).

**Assessment**

By 3-hour unseen written and practical examination and coursework exercises; weighting 80% and 20% respectively.

**Reading**


- Scala Design Patterns by Ivan Nikolov, Packt Publishing; 2016. ISBN-10: 1785882503

  Through extensive course notes and example code. See the module webpage for details.
6 Optional Module Descriptions

6.1 Advances in Data Management (ADM)

Teaching Staff
Richard Brownlow

Online material
http://moodle.bbk.ac.uk/

Aims
To study advanced aspects of database management and recent advances in data management technologies in three major directions: performance, distribution of data, and heterogeneity of data.

The module examines the technologies underlying modern database management systems. It studies advanced aspects of query processing, transaction management, distributed data management, and recent developments in web data, big data and alternative database architectures.

Syllabus

- Review of the fundamental principles of modern database management systems, relational databases and SQL.
- Query processing and query optimisation.
- Transaction management: ACID properties, concurrency control, recovery.
- Beyond records and objects: stored procedures and functions, triggers, semantic technologies.
- Distributed databases: data fragmentation and replication, distributed query processing, distributed transaction management.
- Heterogeneous data integration.
- XML data management.
- Linked Data.
- Parallel databases.
- NoSQL/NewSQL stores.
- Graph databases.
- Data Warehouse architecture trends.
- Data Lakes.
Prerequisites
A first module in Database Systems (e.g. Data and Knowledge Management, Programming with Data or a similar module as taught in a typical undergraduate degree in Computer Science).
Knowledge of computer programming.

Assessment
By 2-hour written examination and coursework, with weighting 90% and 10%, respectively.

Reading
- Research papers will be distributed to students; students will also be directed to Web resources on the subject.
6.2 Information and Network Security (INS)

Teaching Staff
Igor Razgon

Aims
Information security is about protecting information (and information systems) against unauthorised access and tampering. Avoiding security breaches has a high priority for organisations storing and handling confidential data.

The main aim of this module is to provide broad coverage of the field of information security. This course covers the technical as well as the management side of security in information systems. Despite being an essential part of security, technical methods such as cryptography are not enough to guarantee a high level of security. They have to be embedded into a wider context in order to make them more effective. Users of technology have to understand the underlying principles and follow certain policies to avoid security breaches. This module introduces the fundamental approaches to security engineering and includes a detailed look at some important applications.

Syllabus

- Overview of Information Security
- Access Control Matrix Model
- Security Policies
- Social Engineering
- Basic Cryptography
- Identity Management
- Access Control Mechanisms
- Confinement
- Assurance and Trust
- Network Intruders and Intrusion Detection
- Firewalls and Malicious Software
- Cryptographic Protocol Concepts
- Authentication
- Key Exchange
- Economics of Information Security
Assessment

Two-hour written examination (80%) and practical coursework (20%).

Reading


Online material

https://moodle.bbk.ac.uk/
6.3 Internet and Web Technologies (IWT)

Teaching Staff

Peter Wood

Aims

To provide students with an understanding of how network protocols work, particularly those used on the Internet, and the ability to present and manipulate information on the World Wide Web, with an emphasis on XML and JSON.

Syllabus

- Introduction to the Internet and its applications
- Web languages (e.g. HTML, XHTML, XML, JSON)
- Languages for defining Web document types (e.g. DTDs)
- Web query and transformation languages (e.g. XPath, XSLT)
- Client-side processing (e.g. using Javascript, jQuery)
- Server-side processing (e.g. using PHP)
- The transport layer (e.g. TCP, UDP)
- The network layer (e.g. IP, DHCP, ICMP)
- The link layer (e.g. Ethernet, ARP)

Prerequisites

A first module in programming.

Assessment

By 2-hour written examination and coursework exercises, weighted 80% and 20% respectively.

Reading

Online material

https://www.dcs.bbk.ac.uk/~ptw/teaching/IWT/index.html
https://moodle.bbk.ac.uk
6.4 Natural Language Processing and Information Retrieval (NLP)

Teaching Staff
Dell Zhang

Online material
http://www.dcs.bbk.ac.uk/~dell/teaching/ir/

Aims and Outline
The aim of this module is to introduce modern NLP & IR concepts and techniques, from basic text indexing to advanced text analysis. Both theoretical and practical aspects of NLP & IR systems will be presented and the most recent issues in the field of NLP & IR will be discussed. This will give students an insight into how modern search engines work and are developed.

Due to the explosive growth of digital information in recent years, modern Natural Language Processing (NLP) and Information Retrieval (IR) systems such as search engines have become more and more important in almost everyone’s work and life (e.g. see the phenomenal rise of Google). NLP & IR research and development are one of the hottest research areas in academia as well as industry. This module will convey the basic principles of modern NLP & IR systems to students.

Syllabus
- Boolean Retrieval
- The Term Vocabulary and Postings Lists
- Regular Expressions and Text Normalization
- Dictionaries and Tolerant Retrieval
- Edit Distance
- Index Compression
- Scoring, Term Weighting and the Vector Space Model
- Evaluation in Information Retrieval
- Probabilistic Information Retrieval
- Language Models for Information Retrieval
- Language Modeling with N-Grams
- Spelling Correction and the Noisy Channel
• Text Classification, Naive Bayes, and Sentiment Analysis
• Vector Space Classification
• Logistic Regression
• Matrix Decompositions and Latent Semantic Indexing
• Vector Semantics
• Neural Nets and Neural Language Models
• Sequence Processing with Recurrent Networks

Assessment

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

Reading

• Dan Jurafsky and James H. Martin, *Speech and Language Processing*, 3rd ed draft.  
  https://web.stanford.edu/~jurafsky/slp3/
7 MSc Project

Online material

Please refer to the page

http://www.dcs.bbk.ac.uk/dcswiki/index.php/MSc_CS_project

for a detailed description and guidelines.

Aims

In the MSc project students will be able to demonstrate their skills in organising and completing a task that goes beyond a typical coursework assignment. This includes planning and executing a major piece of programming work appropriate to the MSc programme and presenting existing approaches in the problem area (placing the student’s own approach in the wider technical and conceptual context).

The MSc project will offer students the opportunity to:

- develop a systematic understanding and critical awareness of an agreed problem relevant to Computer Science, as described in a project proposal form;
- plan and execute a major piece of programming work appropriate to the MSc programme;
- critically present existing approaches in the problem area, place their own approach in the wider area and evaluate their contribution, and
- gain experience in communicating complex ideas and concepts to others by writing a comprehensive, self-contained report.

Students are encouraged to come up with their own ideas for projects. Students will be asked to select areas of interest for their projects. Allocation of supervisors to students will be done automatically, based on these selected interests. The details of the project will then be discussed between the student and allocated supervisor.

Syllabus

The main part of the module will be done by the students on their own (supported by the supervisor). There is a small taught part of the module (in week 3) in which the students are acquainted with
• how to formulate the objectives/aims of an MSc project
• how to write a project proposal
• how to organise and plan the project
• how to research literature
• how to write a project report.

Assessment

Written project proposal (of about 2000-3000 words) and written project report (of about 10,000 words), weighting 20% and 80%, respectively.

Reading

• As recommended by the supervisor.

Ethical Implications

All activities carried out by Birkbeck staff and students that involve one or more of:

• intervention or interaction with human participants;
• the collection and/or study of data derived from human participants;
• a potential impact on animals or the environment;

requires ethical consideration and approval.

For details see

8 Administration and Assessment

For detailed College rules and regulations see

http://www.bbk.ac.uk/registry/policies

and, in particular,


Below we summarise the most relevant rules for the MSc Computer/Data Science.

8.1 Requirements for the Award of the MSc

Each taught module (all modules except the project) is assessed by a written exam and, in most cases, by additional coursework. The project module is assessed by the project proposal document (20%) and the project report (80%).

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). Up to 30 credits of the taught modules (excluding the project) with a mark between 40% and 49% can be compensated (assuming that the total weighted average mark of the taught modules is at least 50%) on the MSc and on the PGDip (note that College regulations do not allow compensation on PGCert). Additionally, there is a 60-credit project module.

To gain an award, the following is required:

- Postgraduate Certificate (PGCert): pass PoP I and II and two additional compulsory 15-credit modules.
- Postgraduate Diploma (PGDip): pass all compulsory taught modules and one optional taught module.
- Master of Science (MSc): requirements for PGDip and pass the 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 mark.
8.2 Announcement of Results

The Examination Board meets in July to consider the results of the written exams and coursework, and in November to consider the results of the projects and to award degrees.

After the meeting of the exam board, your results and grades will be officially confirmed by the College through My Birkbeck.

Students who have not paid their fees will not get any information about their examination results.

8.3 Choosing the Optional Module

You will receive a form from the Programme Administrator on which you need to indicate your choice of the optional module. You should make this selection by the specified deadline so that your chosen module can be listed among the modules for which you wanted to be assessed that year.

Optional module availability is subject to timetabling constraints and student demand. In the event that an optional module is over-subscribed, available places will be allocated on a first-come, first-served basis determined by the date on which you return your module choice form to the Programme Administrator.

8.4 Examinations

Please consult the Computer Science and Information Systems Moodle page (for enrolled students).

8.5 Coursework

A number of 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 in writing 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 Departments 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 (nor-
mally ten working days after the deadline) is given two marks: a capped 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. If the work is
not of a pass standard a single mark is given.

If you submit work that is to be considered for assessment late, then you
should submit a mitigating circumstances form, see below, 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 capped mark will
stand. If the case is made and accepted then the examination board may allow
the “real” mark to stand.

College policy about the provision of feedback on assessment is as follows.
http://www.bbk.ac.uk/mybirkbeck/services/rules/Feedback-on-Assessment.
pdf
Unlike many other disciplines, feedback on computer science coursework/tests is
often given in the form of model answers/solutions (e.g., program code), rather
than textual comments.

8.6 Projects

Please consult the MSc Computer Science Project and Computer Science and
Information Systems Moodle pages (for enrolled students).

8.7 Mitigating Circumstances and Deferral

A Mitigating Circumstances claim should be submitted if valid detrimental cir-
cumstances 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 submit a Mitigating Circumstances Claim Form to the
Programme Administrator (within 2 weeks of the assessment deadline or exami-
nation). The form can be downloaded from:

http://www.bbk.ac.uk/registry/policies/documents/
mitigating-circumstances-form.docx
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.

In exceptional cases, students may be permitted to defer the written exams to the next examination period and/or the project to the following year. They must apply by filling in a Mitigating Circumstances Claim Form. 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; usually no further deferrals are 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.

8.8 Retake and Reassessment

One reassessment, and 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%.

Students who fail an assessment and are awarded a reassessment opportunity have their reassessment mark 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.

Reassessment for exams takes place in August/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 we do this only for candidates from the previous year, not from further in the past.

Also note that part-time students need to accumulate at least 45 credits (out of the available 75) in their first year in order to progress into the second year.

8.9 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 students 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)

do not have to pay fees. 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 oversubscribed.

Dissertation 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 with supervision 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.

8.10 Assessment Offences and Plagiarism

See

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
9 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.

9.1 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.

9.2 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.

9.3 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
10 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
11 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:

11.1 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/business-services/mentoring-external for more information.

11.2 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 www.bbk.ac.uk/enterprise.

11.3 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.