

**The London Institute
of Banking & Finance**

Data Science (BSc) /

Data Science with Finance (BSc (Hons))



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Programme Specification

1. GENERAL INFORMATION

UCAS Code	Award	Programme Title	Expected Duration	Mode of Study
	Bachelor of Science / Bachelor of Science (Hons)	Data Science / Data Science with Finance	FT 36 months PT 72 months	Full-time Part-time

Credit Count	400 UK Credits
Awarding Institution	The London Institute of Banking & Finance / IU International University of Applied Sciences
Teaching Institution	The London Institute of Banking & Finance / IU International University of Applied Sciences
Relevant subject benchmark statements and other external and internal reference points	<p>External</p> <p>LIBF modules:</p> <ul style="list-style-type: none"> • QAA's UK Quality Code, including Benchmark Statement for Bachelors degrees in Finance (2016) ¹ • Descriptor for a higher education qualification at level 6 in the Framework for Higher Education Qualifications in England, Wales and Northern Ireland (FHEQ) ² • Higher Education Credit Framework for England³ <p>IU modules:</p> <ul style="list-style-type: none"> • German Qualifications Framework (DQR), corresponding to the European Qualifications Framework (EQF)⁴ • Specimen decree⁵ • Thuringian Higher Education Act⁶

¹ <https://www.qaa.ac.uk/quality-code/subject-benchmark-statements> [last accessed June 2022]

² <https://www.qaa.ac.uk/quality-code/qualifications-and-credit-frameworks> [last accessed June 2022]

³ <https://www.qaa.ac.uk/quality-code/higher-education-credit-framework-for-england> [last accessed June 2022]

⁴ https://www.hrk.de/fileadmin/redaktion/hrk/02-Dokumente/02-03-Studium/02-03-02-Qualifikationsrahmen/HQR_EN.pdf (last accessed June 2022)

⁵ https://www.akkreditierungsrat.de/sites/default/files/downloads/2021/171207_Musterrechtsverordnung_Englisch.pdf (last accessed June 2022)

⁶ https://www.tlpc.de/fileadmin/Downloads/Allgemeines/hochschulgesetz_mobil_optimiert_2018.pdf (German) (last accessed June 2022)

	<ul style="list-style-type: none"> • ECTS User's Guide⁷ <p>Internal</p> <p>LIBF modules:</p> <ul style="list-style-type: none"> • The London Institute of Banking & Finance's Code of Practice for Quality Assurance • The London Institute of Banking & Finance Higher Education Credit Framework • The London Institute of Banking & Finance's General and Academic Regulations for Students <p>In addition, research with the financial services sector has been undertaken to ensure that the learning outcomes of the programme address identified skill and knowledge gaps.</p> <p>IU modules:</p> <ul style="list-style-type: none"> • IU Quality Manual
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2. PROGRAMME OVERVIEW

Programme Background

Data Scientist has been famously described as the job with the highest potential of the 21st century because the field offers a diverse mix of capabilities, skills and corresponding opportunities for interesting specialisations. In addition to that, data science, i.e. the generation of insights and value from raw data, is an important aspect of truly digital businesses across all sectors. Data informs not only the optimization of existing processes but, more importantly, becomes the key enabler of entirely new business models.

The BSc Data Science with Finance is an ideal opportunity to acquire the relevant skills and techniques to outperform competition and to prepare for high-performing and meaningful roles in the current data science with finance sector.

Programme Aims

The course aims to:

1. Provide an understanding of the mathematical and statistical fundamentals of data analysis, as well as an overview of current machine learning techniques
2. Allow students to gain expertise in modern data handling technologies at scale
3. Confer software engineering skills for data-intensive applications as an integral part of the curriculum
4. Combine lectures and seminars with hands-on projects to allow students to acquire a portfolio of projects demonstrating their skills
5. Provide opportunities for specialisation through a choice of elective modules
6. Provide students with in-depth understanding of banking and finance

⁷ http://www.ehea.info/media.ehea.info/file/ECTS_Guide/77/4/ects-guide_en_595774.pdf (last accessed June 2022)

Programme Summary

The dual degree programme has been developed jointly between the two institutions to provide a higher education programme that combines Data Science and banking with finance components.

The programme comprises a total of 34 modules plus a Bachelor thesis with a finance focus (400 UK Credits). As part of jointly developed programmes, it has been agreed that 280 UK Credits are contributed by IU, whereas LIBF contributes 120 UK Credits. The part contributed by IU is part of a long-standing and quality-assured programme that is offered within the IU study programme portfolio. IU, as a university of applied sciences, offers since its foundation education with a strong industry-related background, which gives students the chance to have a learning experience close to the labour market. To complement the core study programme with a substantial understanding of financial services, LIBF draws on its, more than, 140 years of experience in educating professionals in banking and finance as well as the unrivalled understanding of the financial services industry, supported by academics with first-hand knowledge and industry experience.

3. INTENDED LEARNING OUTCOMES OF THE PROGRAMME

This programme has been developed in accordance with the QAA Subject Benchmark for Finance (F).

Please note: The programme intended learning outcomes below are described at the Bachelor with Honours level (Level 6).

A) Students will have knowledge and a critical understanding of:

A1: mathematics and statistics.

A2: the methodological, personal and social skills required in the field, and examine the relationship between data science, financial theory and empirical testing.

A3: subject area-related topics, including legal and regulatory financial environments, financial markets and institutions.

B) Students will develop their intellectual skills such that they are able to:

B1: use offered case studies, projects and seminars prepare students for the preparation of written papers and oral presentations.

B2: critically reflect on and engage with course contents and topics relevant to their field, also using specific banking and finance tools.

B3: draw on the acquired knowledge when creating operational or analytical models.

C) Students will acquire and develop practical skills such that they are able to:

C1: devise and implement problem-solving strategies. By offering a combination of practice-based/industry-relevant modules as well as modules focusing on theoretical aspects, the program enables students to actively engage with the subject matter and develop the required problem-solving skills.

C2: devise research questions and, through research and application of the acquired knowledge and solve problems and present results in a presentation or paper, through the use of financial database.

D) Students will acquire and develop transferrable skills such that they are able to:

D1: rely on the communication skills developed during their studies to confidently communicate and cooperate with professional stakeholders at all levels and across various professional fields.

D2: apply the methodological and scientific knowledge acquired in the program to develop a professional self-image in the field of data science in finance which reflects professional aims and standards of their chosen profession.

D3: identify the ethical, social and professional dimensions of the studied contents and associated implications on their work.

4. THE STRUCTURE OF THE PROGRAMME

The structure of the programme is set out below:

Module Name	UK Level	UK Credits	Owner	Workload
Year 1				
Introduction to Data Science*	4	10	IU	150 h
Introduction to Academic Work*	4	10	IU	150 h
Introduction to Programming with Python*	4	10	IU	150 h
Mathematics: Analysis*	4	10	IU	150 h
Collaborative Work*	4	10	IU	150 h
Statistics - Probability and Descriptive Statistics*	4	10	IU	150 h
Object Oriented and Functional Programming with Python*	4	10	IU	150 h
Mathematics: Linear Algebra*	4	10	IU	150 h
Intercultural and Ethical Decision-Making*	4	10	IU	150 h
Statistics - Inferential Statistics*	4	10	IU	150 h
Introduction to Financial Services Sector	4	15	LIBF	150 h
Introduction to Banking Law, Regulation and Ethics	4	15	LIBF	150 h

Module Name	UK Level	UK Credits	Owner	Workload
Year 2				
Database Modelling and Database Systems*	5	10	IU	150 h
Project: Build a Data Mart in SQL*	5	10	IU	150 h
Business Intelligence*	5	10	IU	150 h
Project: Business Intelligence	5	10	IU	150 h
Crypto and Blockchain	5	15	LIBF	150 h
Fintech	5	15	LIBF	150 h
Machine Learning - Supervised Learning*	5	10	IU	150 h
Machine Learning - Unsupervised Learning and Feature Engineering *	5	10	IU	150 h
Data Science Software Engineering*	5	10	IU	150 h
Project: From Model to Production*	5	10	IU	150 h
Agile Project Management*	6	10	IU	150 h
Big Data Technologies	5	10	IU	150 h
Year 3				
Foreign Exchange Exposure and Management	6	15	LIBF	150 h
International Investment Appraisal	6	15	LIBF	150 h
Data Quality and Data Wrangling*	6	10	IU	150 h
Explorative Data Analysis and Visualisation*	6	10	IU	150 h
Cloud Computing	6	10	IU	150 h
Seminar: Ethical Considerations in Data Science*	6	10	IU	150 h
Time Series Analysis*	6	10	IU	150 h
Neural Nets and Deep Learning	6	10	IU	150 h
Introduction to Data Protection and Cyber Security*	5	10	IU	150 h
Model Engineering*	6	10	IU	150 h
Bachelor Thesis: Bachelor Thesis & Colloquium	6	30	LIBF	300h
Bachelor thesis with Finance focus				
* IU modules that contribute to LIBF award				
IU Award	To gain the IU Degree, students must pass all modules.			
LIBF Award	To gain the LIBF UK Honours Degree, students must pass the equivalent of 360 UK Credits including all LIBF modules and all IU modules marked with an asterisk. Students may be eligible for one of the following exit awards if they do not achieve all the credits for the Honours Degree.			
Certificate of HE	Minimum of 120 UK Credits			
Diploma of HE	Minimum of 240 UK Credits of which at least 90 Credits must be at Level 5			
Ordinary Degree	Minimum of 300 UK Credits of which at least 60 Credits must be at Level 6			

5. TEACHING AND LEARNING STRATEGY

Given the joint development process between LIBF and IU, different teaching and learning strategies will be applied to the programme by both higher education institutions. The following shall outline the specifics of both institutions:

The London Institute of Banking & Finance

The learning and teaching strategy of The London Institute of Banking & Finance is designed to ensure that you are encouraged to integrate theory with practice, and challenge each, in line with the organization's ethos. You are expected to undertake a considerable amount of independent study: reading, industry-related research, and personal reflection. Webinars and online discussion forums support your developing abilities to critique and challenge models, theoretical frameworks, and any work-based exposure you may have had, via debate, discussion, research and reports, with your lecturer and fellow students. The mix of discussion and personal research, together with the opportunity to experience workplace practice, accommodate different approaches to learning, and foster a variety of academic skills.

There are two possible modes of study (full-time and part-time):

- On-campus: Learning and teaching via face-to-face lectures, seminars and tutorials primarily at our City of London campus, supported by access to the Virtual Learning Environment and your own independent study. This mode of study is currently not available but may be offered in the future.
- Online distance learning: Learning and teaching centred on the Virtual Learning Environment and own independent study, with both synchronous and asynchronous support from a module lecturer.

The dual degree programme will be offered both full-time and part time, delivery mode is currently distance learning. Delivery is via IU's myCampus platform.

IU International University of Applied Sciences

A key focus of the teaching and learning strategy of IU distance learning programmes is to enable students to acquire knowledge independently.

By providing the means to allow students to devise their own learning approaches and strategies, IU's didactic approach aims to enable students to acquire knowledge independently and in a manner that is suitable to their individual needs and learning styles, with students being able to manage their own learning in a problem-oriented way and teaching staff assuming a supporting role in the development of students' individual learning strategies.

To facilitate this, IU provides a wide variety of learning tools and support mechanisms, matching specific learning tools (explained in more detail at the end of this section) to different learning outcomes.

IU courses have a rolling intake, with students being able to start taking classes at any time, allowing for maximum student flexibility. All modules are taught continuously and are available to be taken throughout the year and at each individual student's course start.

There are time limits that are set out in the regulations. Students can sign up for their final assessment in any module at any time that is convenient for them, once the required formative pre-assessments have been completed and students have demonstrated their

readiness for taking the final exam or paper. Dedicated study advisors are available to support new students at the start of their course and throughout.

Lecturers are prepared to supervise learners at various stages of the course, taking into account that students will be at different stages of their learning journey at any given time in a module. IU provides the materials for modules entirely asynchronously so that student can self-direct their learning journey. Every module is further supported by synchronous tutorials which address current topics and exercises as well as any questions students might have.

The following gives an overview of the methods and types of teaching and learning elements normally offered in the course:

Course books/test books

Course books provide the basis for all learning and are made available to learners digitally, which are compatible with computers and mobile devices.

Online-Tutorials

Webinars are conducted synchronously via virtual classroom with video-based elements. In addition to providing brief knowledge on certain topics, online tutorials primarily serve to answer students' individual questions as well as to allow for group discussions of exercises and practical examples. All compulsory courses include online tutorials. It is normally possible to join the tutorials at any time. In addition, recordings of the tutorials will be offered for asynchronous learning.

Podcasts and video lectures

Both serve primarily as a supplementary way to impart knowledge. Experienced professors and teachers explain the essential material of the lecture notes and provide useful examples. Videos exist in a preview format with an average length of 15 min per chapter and as a detailed version with a length of about one hour per chapter. Long versions have interactive components including self-tests and questions to be answered directly on screen.

Self-tests

These are online-based tests which allow for direct evaluation and feedback. In addition to providing feedback to the students, self-tests also help to evaluate students' progress.

Short casts

Short casts are screencast-based video recordings (usual duration 2-3 mins.), for example explanations of concepts and theories, explanations of exercises with detailed solutions, practical examples and current examples as well as further in-depth knowledge.

Link lists

Lists with URLs to further literature and relevant online resources are also provided to students (e.g. blogs, news, videos, etc.). Literature is made available via library resources; there are license agreements with a large number of relevant databases giving access to relevant research literature.

Communication platforms (e.g. MS Teams)

These are intended to facilitate and further support the course-specific exchange between students, lecturers and tutors.

Video presentations

Online video platforms are available for creating and submitting video presentations. Distance learning students will use this tool in some courses, e.g. to present and record seminar papers or practical projects in a lecture.

Learning App

The IU Learn App is designed to complement the students' learning experience and aims to provide them with additional digital tools to support their learning.

Students can use the app across devices and have all their notes and highlights synchronised. The app supports different learning formats, from reading and annotating course books to assessing knowledge with interactive self-tests or watching the latest videos of their current module.

Learning Sprints

In order to speed up and support self-directed learning, IU has developed the concept of 'learning sprints'. Selected modules will offer four-week intense learning experiences in which the lecturers guide students through the learning material in a very structured manner, with the goal of successfully preparing them to take the final assessment at the end of week 4. During this time, frequent synchronous online meetings are held for the group of students taking part in the learning sprint, and practice assignments are discussed within the group.

Learning Resources

Students will have access to a range of resources, including:

- Lecturer
- Virtual Learning Environment
- IU online library
- Readings

Students will have access to the comprehensive myCampus system. myCampus is the central information hub for students and is hierarchically organized based on courses and modules. New modules are released for access with the student's progression from semester to semester. On the respective module pages in myCampus, students can access all their learning materials (e.g., course books, essay guidelines, case studies, video gallery) as well as the links to all related resources (e.g., MS Teams chat for the module, links to further reading, contact details of lecturers and tutor's links to the booking tool for online exams or Turnitin submissions page).

6. ASSESSMENT AND FEEDBACK STRATEGY

Given the nature of the dual degree programme, different assessment regulations for both institutions apply to students depending on which higher education institution provides the respective module.

Assessment

Progression and Assessment regulations are as set out in The London Institute of Banking & Finance's General and Academic Regulations for Students. Students should also familiarise themselves with The London Institute of Banking & Finance's Code of Practice for Quality Assurance and the Student Charter.

Assessment strategies follow The London Institute of Banking & Finance's Code of Practice for Quality Assurance, Chapter 7: Assessment.

Assessment consists of both formative and summative approaches. The tools used vary across the programme, aiming to provide a mix of examination, assignments, in-class assessment, case-study reports, presentations, debates, peer assessment, portfolios, group work, and individual research.

Details of procedures and deadlines for submission of assessed assignments, penalties applied for late submission and the procedure for requesting an extension to an assignment submission deadline are all published in the Programme Handbook.

The IU Assessment regulations are set out in the General and Programme Specific Regulations.

Student support & Feedback

Learning Support provided by Study Advisors

Every new student will be offered proactive and individual support from a study advisor. Independent of a student's subject of study, advisors help students find a suitable individual learning strategy, an optimal sequence of the modules based on their individual prior knowledge, strengths and preferences. Study advisors also support students in setting personal goals, both in terms of the number of modules taken as well as their timing and number of exams. Students on distance learning degree programmes are closely supported by the study advisors, especially at the start of the course.

Lecturers and tutorials will be hosted virtually via the above myCampus system.

IU has a comprehensive online library; including more than 56 000 online journals. Literature and journals are aligned with the study content and are kept up to date. The Library and Information Services provide all students with access to databases, e-book platforms and open access offers via the learning platform.

These include:

- Journal articles,
- individual book chapters,
- entire e-books
- bibliographic information.

The university keeps the compulsory and further reading mentioned in the course and module descriptions available for the students and aims to provide them with unlimited access.

Feedback

Students will receive feedback during the module, which will include individual and group feedback, as well as a mark for all summative assessments. Students will also receive Feedforward, which will help support students in preparing for upcoming assessments.

7. CREDIT AND AWARD

Credit Framework

On successful completion of the full programme, students will be awarded the Bachelor's degree in "BSc Data Science" (180 ECTS) and "BSc (Hons) Data Science with Finance" (360 UK Credits), respectively.

The following presents an overview on how ECTS credit points convert to UK credit points based on the QAA framework:

This framework provides that generally 10 UK Credit points correspond to 5 ECTS credit points in the Qualifications Frameworks in the European Higher Education Area (QF-EHEA). Accordingly, a 3 years Bachelor's degree of 180 ECTS is 360 UK Credits.⁸ Looking at the workload, though, this is rather an approximate calculation as 10 UK Credits correspond to 100 hours of workload, whereas 5 ECTS credit points at IU correspond to 150 hours of workload. Accordingly, a Bachelor's degree at IU is 5400 hours of workload, whereas a Bachelor from LIBF is 3600 hours of workload.

Our present Dual Degree programme consists of 400 UK Credits: LIBF modules are 15 UK Credits per module and the dissertation is 30 UK Credits.

Exit Awards

Students who do not achieve all the needed credits for a UK Hons degree, may be eligible for an LIBF exit award (See Section 11).

8. PROFESSIONAL RECOGNITION

N/A

9. CRITERIA FOR ADMISSION

- Admission process is the following: IU will manage the online systems for automated student admission and enrolment in line with both partners admissions policies and processes and entry requirements.
- IU's admission criteria stand for IU awards. Dual award candidates shall comply with both.

⁸ ,For example, a bachelor's degrees with honours in England, Wales and Northern Ireland, with a typical total volume of at least 360 credits, equate to 180 ECTS credits as long as the learning outcomes are consistent with the relevant Dublin descriptor' <https://www.qaa.ac.uk/docs/qaa/quality-code/higher-education-credit-framework-for-england.pdf>

Whereas:

- LIBF admission criteria stand for LIBF awards. Dual award candidates shall comply with both.

In consequence, the following criteria will apply for the programme:

The London Institute of Banking & Finance

All applications will be considered holistically and offers will be based on qualifications, subjects studied, any relevant work experience and personal statements demonstrating a desire to work in the finance and banking industry.

Mature students who do not meet the entry criteria may be eligible to enrol under The London Institute of Banking & Finance mature student process. Students entering under this process may be required to submit a CV supported by a 500 - 600 word statement indicating why they have chosen to undertake the programme and how it will support their career plans. If invited to progress, an interview may be held.

Students must be able to satisfy the general admissions criteria of The London Institute of Banking & Finance. Entry requirements for the BSc (Hons) Business Administration with Finance are:

Grades

	Grades	Old UCAS tariff	New UCAS tariff
'A' Levels	BBB – BBC	300 – 280	120 – 105
BTEC	D*DD – DDM	380 – 320	152 – 128
IB	32 – 30	435 – 392	New tariff is at component level

Students are also required to hold:

GCSEs	Old grading system	New grading system
Maths	B	6
English	C	4
IELTS	Overall Score	
	6.0	

Entry at Level 5 still requires an applicant to meet the above requirements, however, if the applicant has studied at Level 4/5 at another university consideration is given to accreditation for prior learning (APL).

If the applicant is an international student, they also need to meet an IELTS grade of 6.0 overall.

Entry at Level 6 is only permitted where we have a specific arrangement with a partner organization or the applicant has previously studied with us and gained a relevant Diploma of Higher Education.

Offers of admission are normally based on 120-105 UCAS points BBB-BBC at A Level. (This excludes General Studies, Critical Thinking, Extended Projects and Citizenship Studies). All applicants are usually required to hold a minimum of GCSE Maths Grade B or

Grade 6 and above GCSE English Grade C or Grade 4. Ideal applicants will have studied one of the following A Levels: Mathematics, Further Mathematics, Economics, Statistics or Physics. We accept the BTEC Extended Diploma at D*DD and the Diploma and Subsidiary Diploma along with other qualifications. We also accept the International Baccalaureate (30-32 points) and holders of the AAT/ACCA diplomas are encouraged to apply. If applicants do not satisfy these criteria, they can communicate with Admissions and discuss entry requirements.

IU International University of Applied Sciences

Entry Requirements

A relevant university entrance qualification. Overseas qualifications may require additional assessment of qualification based on comparability with qualifications within Germany under the guidance of Central Office of Foreign Education (ZAB /ENIC Germany) run by the Standing Conference of the Ministers of Education and Cultural Affairs of the Länder in the Federal Republic of Germany (KMK).

Requirements for UK A-/AS-levels

Entry Requirements for candidates with UK A-levels providing direct access to Bachelor programmes– according to the guidelines provided by the Central Office of Foreign Education (ZAB /ENIC Germany):

- General Certificate of Education - Advanced Level (GCE AL) combined with the
- General Certificate of Education - Advanced Subsidiary Level (GCE AS)

Four examination subjects must be provided, which must be independent of one another and have general, non-vocational content. The following subjects must be represented among these examination subjects:

- A language
- Mathematics or one of the natural sciences biology, chemistry or physics.

At least three of the four subjects must be passed at the level of the General Certificate of Education - Advanced Level (GCE AL), for the fourth subject the level of the General Certificate of Education - Advanced Subsidiary Level (GCE AS) is sufficient.

- Entry Requirements for candidates with UK A-levels providing direct access to Bachelor programmes (valid from summer term 2022) - according to the guidelines provided by the Central Office of Foreign Education (ZAB /ENIC Germany):

Three general examination subjects at A Level with a minimum grade of C.

- 2 subjects from: a language, history, geography, social studies/politics, economics, mathematics, biology, chemistry, physics, computer science
- 1 further general education subject independent of the two subjects chosen above. Individual A Level subjects with vocational content can be considered as a third subject. In this case, the choice of degree programmes is restricted to the subject area of the vocational A Level subject

Requirements for the International Baccalaureate diploma (IB diploma)

1. Requirements are laid out in the regulation of the annual resolution regarding the International Baccalaureate Diploma (IB diploma) of the Standing Conference of the Ministers of Education and Cultural Affairs (KMK):

https://www.kmk.org/fileadmin/veroeffentlichungen_beschluesse/1986/1986_03_10-VB-Baccalaureate-Dipl-engl.pdf

2. Proof of English-language proficiency (with exceptions for English native speakers or graduates from an English-speaking school or university):

- TOEFL (minimum 80 points) or
- IELTS (minimum Level 6) or
- Duolingo English-Test (minimum 95 points) or
- Cambridge Certificate (minimum Grade B)

* Proof must be provided before the start of the course and must be no older than two years.

Recognition of Prior Learning

Both institutions will follow the approved prior learning policies for their respective degree award.

10. GRADUATE DESTINATIONS

Examples of career paths are the following below. The programme also provides a solid foundation for further study at postgraduate (Masters) level.

(JUNIOR) DATA ENGINEER

As a Data Engineer, you take care of the data pipelines of your enterprise. You employ technical expertise in relevant Cloud and Big Data technologies together with current operational methodologies in order to reliably ensure access to data for all business functions.

(JUNIOR) DATA SCIENTIST

From the layout of analytic pipelines to the design of machine learning models, from data quality improvements to the presentation and communication of data related insights, the job market for Data Scientists is as variegated as the field itself, offering a host of opportunities to find someone's niche.

(JUNIOR) ANALYTICS CONSULTANT

Most major consulting companies as well as a lot of specialised consultancies have taken up on the huge demand in the field of Data Science by offering consultancy services with analytics focus. And there is a thriving job market with a wealth of interesting opportunities in this field.

DATA ENGINEER

The reliable provisioning of timely and accurate data in the right format for analytical processing is the foundation any data analysis relies upon. Data engineers tackle this problem by transferring principles from DevOps to the world of data processing.

DATA ANALYST

The field of analytical methods is incredibly rich and varied and students are well prepared for the role as an analytic specialist.

AI SPECIALIST

Machine learning techniques from the field of deep learning are currently being explored in the automation of cognitive tasks like vision, natural language processing and control. This specialisation addresses these application areas, providing you the relevant knowledge to work in these important areas of technological progress.

FINANCIAL SERVICES

Graduates on this course are likely to pursue careers in a number of areas in the financial services industry including commercial & corporate banking, retail banking, investment banking, asset management, treasury, and consultancy.

11. INTENDED LEARNING OUTCOMES FOR THE EXIT AWARDS

Certificate of Higher Education (CertHE)*

On successful completion of this programme, you will be expected to:

- LO1.** Demonstrate relevant programming abilities.
- LO2.** Demonstrate proficiency with statistical analysis of data.
- LO3.** Demonstrate the ability to build and assess data-based models.
- LO4.** Execute statistical analyses with professional statistical software.

* Minimum of 120 UK Credits

Diploma of Higher Education (DipHE)*

On successful completion of this programme, you will be expected to:

- LO1.** Demonstrate relevant programming abilities and how these can be used in finance and fintech
- LO2.** Analyse and interpret financial data, and examine the relationship between theory and empirical testing
- LO3.** Understand and apply the main concepts, theories and data-based models associated with data science and finance.
- LO4.** Execute statistical analyses with professional statistical software.

* Minimum of 240 UK Credits of which at least 90 Credits must be at Level 5

12. CURRICULUM MAP OF MODULES AGAINST INTENDED LEARNING OUTCOMES OF THE PROGRAMME

Explanation of 'TDA' abbreviations:

T= Taught D= Developed A= Assessed

Year	Module Title and Code		Learning Outcomes										
	Code	Module title	A.1	A.2	A.3	B.1	B.2	B.3	C.1	C.2	D.1	D.2	D.3
Year 1 (Level 4)	DLBDSIDS	Introduction to Data Science	TD										
	DLBCSIW	Introduction to Academic work								TDA	TD		
	DLBDSIPWP	Introduction to Programming with Python		TD					TD			D	
	DLBDSMFC	Mathematics: Analysis	TD						D				
	DLBCSCW	Collaborative work							DA	TA	DA	TD	D
	DLBDSSPDS	Statistics - Probability and Descriptive Statistics		TD					DA				
	DLBDSOOFPP	Object Oriented and Functional Programming with Python		TD					D				
	DLBDSMFLA	Mathematics: Linear Algebra	TD						TA				
	DLBCSIDM	Intercultural and Ethical Decision-Making							D	D	TD		DA
	DLBDSSIS	Statistics: Inferential Statistics	T	D									
	LIBFBBAEFFB01	Introduction to Financial Services Sector	TA		TDA		TD	D	T			TD	TD
	LIBFBBAEFFB02	Introduction to Banking Law, Regulation and Ethics	TA		TDA		TD	D	T			TD	TD
Year 2 (Level 5)	DLBCSDMDS	Database Modelling and Database Systems		DA									
	DLBDSPBDM	Project: Build a Data Mart in SQL		DA		DA		DA	TDA	DA		DA	
	DLBDBBI	Business Intelligence		D									
	DLBCSEBI2	Project: Business Intelligence		D		DA							
	LIBFBBAEFT01	Crypto and Blockchain		DA	TD		DA		DA		DA	DA	DA
	LIBFBBAEFT02	Fintech		DA	TD		DA		DA		DA	DA	DA

Year 3 (Level 6)	DLBDSMLSL	Machine Learning - Supervised Learning	T	TD	TD			A	D				
	DLBDSMLUSL	Machine Learning - Unsupervised Learning and Feature Engineering	T	TD	D			A	D				
	DLBDSDSSE	Data Science Software Engineering		DA	DA			D	D				
	DLBDSMTP	Project: From Model to Production										DA	D
	DLBCSAPM	Agile Project Management										DA	
	DLBDSBDT	Big Data Technologies											
	LIBFBBAEIF01	Foreign Exchange Exposure and Management			TD	TD	DA		DA	DA	DA	DA	DA
	LIBFBBAEIF02	International Investment Appraisal			TD	TD	DA		DA	DA	DA	DA	DA
	DLBDSQDW	Data Quality and Data Wrangling	TD	TD			DA	TA	TDA	TDA			
	DLBDEDAV	Explorative Data Analysis and Visualization	TD	TD		D				DA	DA		
	DLBDSCC	Cloud Computing	TD	TD						A			
	DLBDSSECDs	Seminar: Ethical Considerations in Data Science				TDA							DA
	DLBDSTSA	Time Series Analysis	TDA	TDA				DA					
DLBDSNNDL	Neural Nets and Deep Learning	TDA	TDA				DA						
DLBCSIDPITS	Introduction to Data Protection and Cyber Security			TD		TDA						DA	
DLBDSME	Model Engineering			TD		TD	DA						
DLBBT	Bachelor Thesis Bachelor Thesis & Colloquium			DA	DA						A	DA	DA

1 Written assessments

Exams

We offer proctored online exams, in which students' computers and surroundings are remotely surveilled during the exam. This offers students the advantage of being able to take exams from almost anywhere in the world. When opting for this type of examination, several specific technical and security terms apply, further information on this is available on request.

Alternatively, it is also possible to take exams in any Goethe institute worldwide at a set time/date once a month.

Any module concluding with a traditional, summative exam will offer at least three forms of formative assessment: Firstly, a multiple-choice test needs to be passed in order to access the booking tool for signing up to the final exam. There is no limit on the number of times this multiple-choice test can be taken. Secondly, at least two sample exams with answers are offered for students' self-assessment. Thirdly, synchronous online meetings with lecturers and fellow students will provide students with direct and indirect feedback on their progress.

Written homework assignments

A written homework assignment allows to assess students' academic writing skills. In a written homework assignment, students demonstrate that they can select an academic topic, undertake the relevant research, and use that research to support their own thoughts and insights.

Case studies

Case studies in the field of economics are often based on real-life scenarios from the past. However, fictitious scenarios concerning companies and organizations are equally suitable for this purpose. Case studies do not contain a structured preparation of knowledge like textbooks and instead focus on complex, incomplete, unstructured, imprecise, and ambiguous real-life problems.

Case studies are used to gain useful insights through analysis and examination. Ideally, these findings can be transferred to other cases and situations. As a result, case studies support the development of analytical skills, sharpen the ability to separate important and irrelevant information and provide new alternatives for action. Applied learning through case studies is the central focus of a case study module.

Research Essays

A research essay allows students to demonstrate their ability to work independently in a scientific manner. Students can prove that they are able to independently comprehend a scientific topic, formulate a research question as required, research relevant literature and justify their own thoughts and findings on this basis.

Project reports

A project report is a written elaboration of a project. The difference to a research essay or a written homework assignment lies in the practical aspect which precedes the writing of the report. The project report combines specialized knowledge and transfer of knowledge into practice.

The entire process from the idea, through development, implementation, review and anchoring is mapped and transparently documented in a project report. The project report should be as complete, precise, and comprehensible as possible, providing information about the individual work or development steps and the approach taken. As a record of the entire project work process with its intermediate steps and products, a finished project report includes a reflection on the approach and

methodology and consideration of the necessary and available resources. The final product must also be documented in a suitable and appropriate manner.

Portfolios

In a portfolio, students document a creative process, leading to a practical project. In contrast to a written project report, this examination format combines the practical implementation and development of a product with digital documentation as part of a portfolio. The individual learning and examination process is recorded and accompanied in a reflective manner.

A portfolio consists of three phases which are intended to illustrate the individual work or development steps and the adopted approach. The learning progress or increase in competence achieved in this multi-phase process is documented using three portfolio phases within a portfolio software called 'PebblePad'. The three phases mentioned are the conception phase, the development/reflection phase and the finalisation phase. The finished portfolio is the product of an entire editing process with its intermediate steps including the final product, a reflection of the approach, and methodology within the framework of a two-page abstract.

Workbooks

A workbook is a digital open-book form of examination, which is graded after all assignments within the workbook have been answered and documented successfully. The workbook consists of six assignments which are based on the course book content. Students will have to elaborate and work on the questions independently and submit them via Turnitin. The focus of the assignments is on knowledge transfer, i.e. on using and interlinking the knowledge gained from the course book. Answers should go beyond the course material and incorporate students' own approaches, well-founded opinions and lines of reasoning.

2 Oral assessments

Oral assignments

An oral assignment should demonstrate students' abilities to work and present in an independent and academic manner, i.e. show the students' capability to independently grasp academic topics, research relevant literature, and, based on that, substantiate their own thoughts and findings based on scientific theory. It also showcases students' ability to prepare an academic topic or concept and present it to an academic audience in a comprehensible way.

Oral Project Reports

This examination format involves an oral presentation of a project, based on independent conceptualisation, implementation and documentation. The oral project report assesses students' ability to combine expert knowledge with the transfer of this knowledge into practical application, e.g. as applied to a real-life problem within a business environment. The result of this report always consists of a "product" – either tangible (e.g., a physical engineering model) or a concept, software solution, installation or process.

The presentation is intended to inform the audience about the individual work or development steps and the approach taken. It should be comprehensive and provide an overview of the entire project management process with its intermediate steps and products, including a brief reflection on approach and methodology. It is also part of this project report to procure the necessary resources. These may consist of data, surveys, applications, technical equipment, software, various tools, etc. Detailed reference within the presentation is not necessary.

3 Examination and assessment tools

We use Turnitin as a platform for submitting papers and assignments and as an anti-plagiarism tool. All papers will be uploaded onto IU's Turnitin site, where they are automatically checked for plagiarism and subsequently graded.

More detailed guidelines on content, structure and format of the above assessments as well as instructions for submitting work and presentations, Academic Writing and Citation guides and Guidelines on How to Avoid Plagiarism are available via the MyCampus platform.