Date: 19-05-2026

BSc (Hons) Applied Data Science

UCAS code	SQ01
Institution code	H12
Start date	September 2027
Location	Station Quarter

Why study Data Science?

Data Science is the driving force behind some of our largest global developments and most fascinating careers. From air pollution prediction to cancer detection and Artificial Intelligence; data scientists discover the truth behind information and use it to make a tangible difference to the world we inhabit.

In response to the UK's Digital Skills Gap, where nearly half of businesses are actively searching for digital talent, we're empowering students to become future-ready and emerge as the next generation of digital experts! Learning in our state-of-the-art business community, Station Quarter, you will hone the skills needed to build a successful career in Applied Data Science; including computing, machine learning, AI and wider academic skills.

But why Harper Adams University?

Here at Harper Adams, we're proud to champion our Digi-Bridge principle, offering a degree programme that equips you with the essential skills that are often missing from secondary education. This means that when you step into the 'real world', you'll be thoroughly prepared with a skill set that sets you apart from other graduates in the field.

The 'Applied' in our degree title also isn't just a label; it's a commitment to practical learning. We work closely with industries to create degrees that prepare you to meet the needs of the workforce, now and in the future — which is why we've been the number one University in the UK for career prospects for nine years running.

Our data science team is made up of industry experts who are deeply engaged in research and sector developments, ensuring your education is always current, relevant, and tailored to industry needs. Throughout your time at Harper Adams, you'll actively participate in real-world business cases, live hackathons and inspiring 'TED'-style Talks. This hands-on approach means that every class and workshop give you skills that can be put to immediate use, setting the stage for a successful career in data science.

A-level entry requirements

- **Entry requirements for 2027 entry are not currently available. Please contact Admissions for advice**

How will I be taught?

Our Applied Data Science degree at Harper Adams is centred on immersive, hands-on learning. Throughout your journey here, you'll consistently have opportunities to showcase your skills through various assessments: including quizzes, assignments, and engaging projects. In the final phase of your studies, you'll apply your acquired knowledge and learning to address a practical data science challenge for a real-world business.

As a student, you'll actively participate in workshops, seminars, and have the invaluable chance to learn from industry experts during guest speaker sessions. Additionally, you'll have access to online learning materials to prepare and test your knowledge, enabling you to then put theory into practice during class. We foster a dynamic learning environment that blends both online and in-person collaborative experiences, providing a well-rounded understanding of the subject matter.

To bolster your academic success, we offer supplementary online learning and access to tutoring services. Our program is designed to prepare you not just for academic achievement, but also for a future in the field of data science, equipping you with practical skills and knowledge necessary for success in both the data-driven industry and further education.

What will I study?

Year 1		Year 2		Year 3	
Computing Technology (SQ4007)	20	Databases	20	Honours Degree Project	40
Data Visualisation (SQ4012)	20	Information Design	20	Artificial Intelligence (AI) Methods	20
Professional and Study Skills (SQ4003)	20	Interdisciplinary Project	20	Generative Artificial Intelligence (AI)	20
Programming Concepts (SQ4011)	20	Internet of Things (IoT) and Edge Computing	20	Deep Learning for Computer Vision	20
Real World Artificial Intelligence (SQ4014)	20	Artificial Intelligence (AI) Frameworks	20	Statistical Learning	20
Thinking with Data (SQ4013)	20	Sustainability and Ethics for Machines and Humans	20		

Computing Technology

Year of study 1
Code SQ4007
Credits 20
Core/option Core

The "Computing Technology" module is designed to provide a broad introduction to computer science and to a range of programming languages, suitable for those with or without prior programming experience. This module emphasises problem-solving techniques, both computational and non-computational, focusing on correctness, design, and style. It provides a foundational understanding of computational thinking, abstraction, algorithms, data structures, and the broader spectrum of computer science. The module transitions through various programming languages, starting with C and moving to Python, SQL, HTML, CSS, and JavaScript, thus offering a broad understanding of the field. The flexible structure of this module ensures its relevance and adaptability for both current industry practices and future technological advancements. This module is an overview of basic algorithms and a survey of many different computational language implementations.

Intended Learning Outcomes:

1. Analyse and solve problems using computational thinking, applying fundamental concepts of computer science across various domains.

2. Design and implement algorithms in different programming languages, demonstrating a clear understanding of functions, variables, conditionals, loops, and data structures.

3. Evaluate and improve the correctness, design, and style of code, showcasing the ability to assess and optimise computational solutions.

4. Synthesise knowledge of programming concepts to create web and mobile applications, employing technologies like HTML, CSS, and JavaScript.

5. Apply the principles of data management using SQL for effective storage and retrieval of information.

Data Visualisation

Year of study 1
Code SQ4012
Credits 20
Core/option Core

The "Data Visualisation" module is for individuals who will engage with quantitative data in various professional contexts. Emphasising the grammar of graphics (typically using the R statistical programming language, and e.g. the {tidyverse} and {ggplot2} libraries), this module aims to equip students with skills to create and visualise data which are needed to create compelling figures, tables, and reproducible reports. The module is structured to provide clear guidance and a structured learning path, making it accessible to first-time users. This module is essential in today's data-centric work environment, offering data analytics skills, such as visualising and communicating data graphically to a diverse audience, that are highly relevant and widely applicable across disciplines in business, societal and environmental sectors.

Intended Learning Outcomes:

1. Apply the basic concepts of data visualisation.

2. Create a variety of visualisations, demonstrating the ability to represent data in a visually compelling manner.

3. Analyse and refine plots to enhance the clarity and aesthetic appeal of data presentations.

4. Synthesise knowledge of data visualisation techniques to produce reproducible reports and presentations.

5. Evaluate the effectiveness of data visualisations, developing a critical eye for data representation and aesthetics.

Professional and Study Skills

Year of study 1
Code SQ4003
Credits 20
Core/option Core
Module contact Dr Edwin Harris

"Professional and Study Skills" is a module designed to equip students in data science, business, and engineering with essential professional and academic skills. This module provides an opportunity to develop capabilities in key areas such as research, writing, web technology, Markdown, Excel, tidy data management, introductory programming, and effective presentation techniques. By integrating these skills, the module supports students in becoming proficient and adaptable professionals, capable of excelling in their academic and future career pursuits.

Intended Learning Outcomes:

1. Research and synthesise literature relevant to data science, business, and engineering, demonstrating effective information gathering and analysis skills.

2. Develop and maintain web pages using GitHub and Markdown, showcasing an understanding of basic web development principles.

3. Utilise Excel for data analysis and management, applying principles of tidy data for efficient data handling.

4. Implement basic programming concepts using tools like Code Copilot and command line interfaces.

5. Design and deliver compelling presentations, effectively communicating complex ideas to diverse audiences both technical and non-technical.

Programming Concepts

Year of study 1
Code SQ4011
Credits 20
Core/option Core

This module offers an engaging introduction and an overview to programming, utilising a modern programming language (typically Python). Designed to accommodate both novices and those with some programming background, it covers a spectrum of fundamental concepts of coding. Key topics include reading and writing code, testing, debugging, and utilising Python-specific features. This module provides essential underpinning skills for other computer science modules. The content will be highly relevant and adaptable, enhancing employability and professional development in technology-driven industries. This module focuses on a single programming language such as Python as a modern, scalable toolbox, building on The Computing Technology module which is an overview of basic algorithms and a survey of many different computational language implementations.

Intended Learning Outcomes:

1. Analyse and apply programming concepts to develop functional code, showcasing the ability to interpret and create basic programming structures.

2. Construct and execute scripts, using loops, conditionals, and data structures, demonstrating comprehension and practical application.

3. Evaluate and debug code, applying systematic approaches to identify and resolve coding issues, enhancing code reliability and performance.

4. Create and manipulate classes and objects, illustrating understanding of object-oriented programming principles.

5. Synthesise knowledge of programming to develop solutions for real-world problems, demonstrating creativity and adaptability in coding.

Real World Artificial Intelligence

Year of study 1
Code SQ4014
Credits 20
Core/option Core

Real World Artificial Intelligence (AI) is an innovative module that focuses on the application of large language models (LLMs) and application programming interfaces (APIs) to automate generative AI

workflows. The module introduces students to the dynamic world of data science, emphasising the use of cutting-edge technologies like vector databases and the OpenAI API. It is designed to develop skills in prompt engineering and the creation of efficient data processing systems, including customer service chatbots. This module is crucial for students aiming to excel in the rapidly evolving field of data science and technology, providing them with the skills necessary for developing advanced applications in various sectors.

Intended Learning Outcomes:

1. Develop and apply complex workflows using chain calls to LLMs, demonstrating an understanding of automated systems.

2. Construct and analyse systems where Python code interacts with both completions and new prompts, showcasing programming proficiency.

3. Design a customer service chatbot using learned techniques, reflecting an ability to integrate various aspects of data science technology.

4. Evaluate and apply prompt engineering skills in practical scenarios, including chat agent response systems and safety evaluations.

5. Synthesise and apply knowledge of vector databases in building applications like retrieval augmented generation (RAG) and multilingual search systems.

Thinking with Data

Year of study 1
Code SQ4013
Credits 20
Core/option Core

"Thinking with Data" is an introductory module for students new to data science, statistics, and R programming. It is designed to be foundational training in R programming, basic statistical data analysis techniques, and open science tools. The module aims to equip students with the necessary skills to efficiently engage in data science practices, preparing them for further training. The structure integrates assessment materials with lectures, readings and problem-based learning to ensure a comprehensive learning experience. This module is crucial for students aiming to develop essential data-handling skills in today's data-driven world, providing a strong foundation for academic and professional growth in the field of data science.

Intended Learning Outcomes:

1. Apply and understand basic reproducible data analysis techniques and software, establishing foundational programming skills.

2. Analyse data to perform simple data analysis tasks, demonstrating an ability to handle and interpret data effectively.

3. Create skills in creating reproducible code and using tools like Markdown and GitHub, emphasising open science and collaborative practices.

4. Synthesise and apply the learned skills to engage in basic data science tasks, preparing for further advanced studies in the field.

Databases

Year of study 2
Credits 20
Core/option Core

"Databases" is a comprehensive Level 5 module designed to introduce students to the fundamentals of database management using SQL. This module offers an in-depth exploration of relational databases, focusing on how they store data in rows and columns and how to effectively manipulate this data. Students will learn to model real-world entities and relationships using tables, triggers, and constraints, and understand the importance of data normalisation. The course also covers advanced topics like joining tables, automating searches with views, and optimising searches with indexes. Additionally, students will learn to integrate SQL with programming languages like Python and Java.

Intended Learning Outcomes:

1. Create and manipulate relational databases using SQL, demonstrating proficiency in data management.

2. Model real-world entities and relationships using advanced database features like triggers and constraints.

3. Normalise data to eliminate redundancies and minimise errors in database design.

4. Implement complex SQL queries to join tables and automate searches, showcasing advanced data retrieval skills.

5. Integrate SQL with programming languages like Python and Java, enhancing data processing capabilities.

6. Evaluate the use of different database systems for various application needs.

Information Design

Year of study 2
Credits 20
Core/option Core

This module covers the essentials of modern statistical analysis and experimental design and introduces the general linear model, emphasising practical applications in scientific disciplines such as ecology, agriculture, and environmental science. It reviews basic statistics, including linear models, to set a standard for creating and consuming scientific evidence. The module aims to develop skills in designing data collection strategies and performing statistical analyses to modern standards. It is particularly beneficial for students aiming for MSc and PhD research or careers involving data analysis, evidence interpretation, or statistical numeracy.

Intended Learning Outcomes:

1. Demonstrate the ability to design effective data collection strategies, including sampling and justifying sample size, aligned with research objectives.

2. Apply knowledge to construct scientific hypotheses and select appropriate statistical methods within a null hypothesis testing framework.

3. Utilise a software package to conduct repeatable statistical analyses, showcasing proficiency in a variety of methods.

4. Exhibit problem-solving skills in data handling and assumption testing for typical statistical analysis methods.

5. Interpret and effectively communicate the results of statistical analyses, presenting them in formats suitable for various experimental designs.

Interdisciplinary Project

Year of study 2
Credits 20
Core/option Core

This module engages students in an interdisciplinary approach to problem-solving and research within a design and consultancy context. It emphasises the identification and solution of real-world problems, requiring students to critically analyse a subject domain, establish design boundaries, and devise innovative solutions. This module cultivates essential skills in project planning, execution, and presentation, preparing students for diverse professional environments. Workshops supporting project design, methodology, and presentation skills are integral, enhancing the student's ability to contribute effectively in varied interdisciplinary settings. This module is crucial for developing the agility and adaptability required in contemporary professional fields.

Intended Learning Outcomes:

1. Critque the current state of understanding of a problem, utilising appropriate information and research techniques.

2. Formulate advanced and creative solutions or proposals to enhance the current state of knowledge in the subject domain.

3. Design effective methods to deliver a solution to the identified problem, demonstrating innovative thinking and practical skills.

4. Interpret, report, and present the project rationale and solution coherently within the context of the existing knowledge base, utilising appropriate communication skills and formats.

Internet of Things (IoT) and Edge Computing

Year of study 2
Credits 20
Core/option Core

This module provides a comprehensive introduction to the Internet of Things (IoT) and Edge Computing using microprocessor platforms (e.g. and hereafter, Raspberry Pi). It is designed to familiarise students with the fundamentals of IoT devices, including installation, configuration, and operation of a Raspberry Pi, along with basics of the Linux command line. Students will typically explore practical applications such as controlling I/O, GPIO pins, creating web APIs, and understanding electronics theory. The module also delves into more advanced topics like motor control and building web-enabled home automation projects.

It is tailored for those seeking to understand how to control and interface with hardware using IoT devices and is essential for careers in modern technology fields.

Intended Learning Outcomes:

1. Demonstrate the ability to install and configure operating systems on IoT devices like Raspberry Pi and establish network connections.

2. Understand and apply basic electronics theory to control hardware such as LEDs using Raspberry Pi.

3. Create and utilise web API endpoints for controlling IoT devices and understand the principles of web-based control interfaces.

4. Engage in the design and implementation of complex systems, including home automation projects, using skills acquired in IoT and Edge Computing.

5. Analyse and apply security concepts relevant to IoT systems, ensuring safe and secure operation.

Artificial Intelligence (AI) Frameworks

Year of study 2
Credits 20
Core/option Core

This module addresses foundational concepts and algorithms of modern artificial intelligence (AI), introducing the theories, practices and tools that underpin AI technologies, such as game-playing engines, handwriting recognition, and machine translation. The module emphasises hands-on learning, where students will actively engage with graph search algorithms, classification, optimisation, machine learning, and large language models. By integrating these concepts into programming projects, students will gain a working understanding of AI frameworks and acquire the skills to design and implement intelligent systems.

Intended Learning Outcomes:

Students who successfully complete this module will be able to:

1. Analyse and understand the foundational concepts and algorithms that underpin modern artificial intelligence.

2. Develop Python programs that incorporate AI technologies, demonstrating practical application of AI frameworks.

3. Evaluate and apply graph search algorithms, classification, and optimisation techniques in AI.

4. Design and implement intelligent systems using principles learned from machine learning and large language models.

5. Synthesise knowledge of AI frameworks with practical programming skills to create innovative AI solutions.

Sustainability and Ethics for Machines and Humans

Year of study 2
Credits 20
Core/option Core

"Sustainability and Ethics for Machines and Humans" is a pivotal module designed to address the broad spectrum of ethical issues emerging in fields such as artificial intelligence, robotics, and engineering. The course delves into the complexities and challenges posed by the integration of advanced technologies in society. It critically examines the ethical implications including deploying AI and automation systems, as well as the responsibilities of individuals in creating technology that aligns with societal values and ethical standards. The module emphasises the importance of ethical decision-making in the development and application of these technologies, highlighting the impact on various aspects of human life.

Intended Learning Outcomes:

1. Evaluate the ethical implications and challenges of AI, robotics, and engineering projects in various real-world scenarios.

2. Assess the balance between technological advancement and ethical considerations in robotics and engineering.

3. Analyse case studies on the ethical deployment of AI and robotic systems, focusing on the societal and moral impact.

4. Apply ethical principles in the design, development, and implementation of AI and robotics, ensuring responsible and sustainable technological solutions.

5. Synthesise knowledge through practical projects, demonstrating the ability to address ethical dilemmas in AI, robotics, and engineering contexts.

Honours Degree Project

Year of study 3
Credits 40
Core/option Core

This module is tailored for data science students to develop and demonstrate skills in analysis, critical evaluation, reflection, and logical argumentation. Emphasising the importance of communicating complex data science concepts to diverse audiences, this module includes a significant independent project, including a stakeholder engagement element. Drawing on knowledge from other data science modules, it requires substantial self-guided learning. You will be supported in selecting a data-driven research topic and managing your project's scale and scope. The module encompasses instruction on data science methodologies, information sourcing, data analysis, and synthesizing findings into coherent reports. Ethical considerations, particularly in data handling and privacy, stakeholder sensitivity, and adherence to health and safety protocols, are integral to this module. Supervised individually and in groups, you will work autonomously yet collaboratively to plan and execute your project.

Intended Learning Outcomes:

1. Apply rigorous analytical methods to primary and/or secondary data sources to investigate a specific data science question, hypothesis, or problem.

2. Independently define the scope of a data science research area and ethically conduct research with minimal supervision.

3. Plan and effectively communicate the results of a data science investigation, demonstrating logical consistency in approach, and critical evaluation of theory, processes, and outcomes.

Artificial Intelligence (AI) Methods

Year of study 3
Credits 20
Core/option Core

This module "Artificial Intelligence (AI) Methods" is a survey of applications of a range of modern AI tools, demonstrating rapid problem-solving in a project-based framework. Students will engage in building solutions incorporating methods such as deep learning, computer vision, natural language processing (NLP), tabular analysis, and collaborative filtering. The module will cover the use of frameworks such as PyTorch, fastai, and Hugging Face, and similar technologies at the forefront of deep learning software. Students will also learn about deploying AI models and turning them into web applications. The module is designed to develop a hands-on approach to why and how deep learning models work, with a focus on enhancing accuracy, speed, and reliability. The module gives the opportunity for rapid prototyping in a series of small project-based problems. This module focuses on applications of AI tools, building on the foundational toolset gained at Levels 4 and 5.

Intended Learning Outcomes:

1. Build and train deep learning models for tasks in computer vision, NLP, tabular analysis, and collaborative filtering.

2. Create random forests and regression models, understanding their application and significance.

3. Deploy AI models effectively and convert them into functional web applications.

4. Utilise advanced deep learning techniques, such as data augmentation, weight decay, and transfer learning, to improve model performance.

5. Synthesise, comprehend and implement stochastic gradient descent and related training processes.

Generative Artificial Intelligence (AI)

Year of study 3
Credits 20
Core/option Core

This module explores the technologies underpinning Generative Artificial Intelligence (AI), focusing on Large Language Models (LLMs) and their applications. Students will acquire an understanding of generative AI, from the fundamentals of data gathering, model training, tuning, and model selection to performance evaluation and deployment. The course emphasises the transformer architecture behind LLMs, training methods, and fine-tuning techniques to adapt models for specific use cases. Additionally, the module explores empirical scaling laws, state-of-the-art training, tuning, and deployment strategies to optimise model performance. Insights from industry researchers and practitioners will offer a real-world perspective on the challenges and opportunities presented by generative AI. This module is essential for learners aiming to develop a practical intuition for utilising generative AI technologies effectively.

Intended Learning Outcomes:

1. Demonstrate a comprehensive understanding of the key steps in the LLM-based generative AI

lifecycle, including model selection and performance evaluation.

2. Articulate in detail the transformer architecture of LLMs, their training processes, and fine-tuning for diverse applications.

3. Apply empirical scaling laws to optimise the model's objective function across dataset size, compute budget, and inference requirements.

4. Utilise advanced training, tuning, and deployment methods to maximize the performance of generative AI models.

5. Analyse the impact of generative AI in business contexts, understanding both challenges and opportunities.

Deep Learning for Computer Vision

Year of study 3
Credits 20
Core/option Core

This module delves into the rapidly evolving field of Computer Vision, a cornerstone in diverse applications ranging from image analysis to self-driving vehicles. The focus is on visual recognition tasks such as image classification, localisation, and detection, utilising advanced deep learning techniques. Over the course, students will typically implement and train neural networks and also gain a comprehensive overview of contemporary developments in computer vision. The module culminates with a project where students apply their learned skills to real-world vision problems, leveraging multi-million parameter networks. This module is essential for those aspiring to specialize in AI-driven visual recognition systems and applications.

Intended Learning Outcomes:

1. Formalise Computer Vision Tasks: Accurately formalise computer vision applications, defining clear inputs and outputs for vision-related problems.

2. Develop and Train Vision Models: Gain proficiency in coding, debugging, and training convolutional neural networks using frameworks like PyTorch and TensorFlow.

3. Comprehend Field Evolution: Understand recent developments in the field and identify current research challenges, along with ethical and societal considerations in deployment.

4. Apply Neural Networks to Real-World Problems: Implement deep learning architectures to solve practical computer vision tasks, demonstrating advanced problem-solving and technical skills.

Statistical Learning

Year of study 3
Credits 20
Core/option Core

This module offers a comprehensive introduction to machine learning and statistical pattern recognition, providing foundational knowledge applicable to various domains such as robotics, bioinformatics, and data processing. Covering both supervised and unsupervised learning, the course delves into neural networks, support vector machines, clustering, dimensionality reduction, and more. It also emphasises learning

theory, including bias/variance trade-offs and reinforcement learning. Practical applications are explored through appropriate frameworks, e.g. Python or R and associated libraries, with a focus on real-world examples. This course is pivotal for students seeking a deep understanding of machine learning and its diverse applications in the modern world.

Intended Learning Outcomes:

1. Apply concepts of both supervised and unsupervised learning, including generative/discriminative learning and clustering.

2. Implement and evaluate various machine learning algorithms like neural networks, support vector machines, and decision trees.

3. Comprehend learning theories, including bias/variance trade-offs and reinforcement learning concepts.

4. Develop proficiency in R/Python/Numpy for machine learning applications and understand evaluation metrics for model performance.

5. Critically assess the ethical considerations in machine learning, including fairness, bias, and privacy.