

CAREERS THROUGH MATHS: LIBRARIAN



JOB DESCRIPTION

A librarian in the UK is a highly skilled information professional responsible for the curation, management, and dissemination of knowledge within a specific organisation or for the public. Their daily responsibilities extend far beyond simply checking out books; they are experts in information architecture, digital resource management, and data literacy. A librarian's work environment is incredibly diverse, ranging from the historic reading rooms of institutions like the British Library or Bodleian Library to the dynamic, modern hubs of corporate information centres in firms like BBC Archives or legal libraries in magic circle law firms. They may also work in academic settings at universities like UCL or specialised research institutions, public libraries run by local authorities like Camden Council, or within the NHS managing critical medical information.

Key duties are deeply analytical and require a meticulous approach. These include developing and managing complex classification systems (like Dewey Decimal or in-house taxonomies), conducting in-depth literature and systematic reviews for researchers, negotiating and managing budgets for journal subscriptions and database access, and providing expert user support to patrons navigating vast digital and physical collections. A significant part of their role involves curating and preserving both physical archives and born-digital materials, ensuring long-term access and authenticity.

Mathematics is central to the modern librarian's role, underpinning nearly every strategic decision they make. It is not merely about counting books but about

applying statistical, financial, and data management principles to optimise collections, justify budgets, demonstrate service impact to stakeholders, and harness the power of data analytics to understand user behaviour and improve services. The role has evolved into that of a data scientist for information collections, requiring a strong quantitative skill set to manage resources effectively in an era of tight budgets and information overload.

HOW MATHEMATICS IS USED

- **Statistics and Data Analysis:** Librarians heavily rely on statistics to make evidence-based decisions and prove their service's value. They analyse complex datasets on resource usage, such as download rates for e-journals, footfall figures, and database search queries. For example, a university librarian at the University of Manchester might use regression analysis to correlate database usage statistics with student attainment rates, providing hard data to justify a costly subscription renewal to the faculty board. They also conduct and analyse user surveys, employing statistical methods to identify trends and gaps in service provision for their local community.
- **Budgeting and Financial Management:** Financial mathematics is a critical daily function. Librarians are responsible for substantial materials budgets, often exceeding hundreds of thousands of pounds. They must perform cost-benefit analyses to decide between subscription packages from publishers like Elsevier or Sage, calculate cost-per-use metrics for databases, and forecast future budgetary needs based on inflation rates and currency exchange fluctuations (crucial for purchasing resources from overseas). In a public library service, they might use these skills to build a financial case for a new digital literacy programme aimed at reducing local digital exclusion.
- **Information Retrieval and Search Algorithmics:** At the heart of library systems is applied mathematics. Understanding Boolean logic (AND, OR, NOT) is fundamental to constructing effective search queries in catalogues and databases. Furthermore, librarians need a conceptual grasp of how search algorithms and relevance ranking work within systems like the COPAC national union catalogue or commercial discovery layers. This knowledge allows them to troubleshoot failed searches, optimise findability for users, and better organise metadata so it can be effectively processed by these mathematical systems.

- **Collection Management and Predictive Analytics:** Librarians use mathematical modelling for strategic collection development. They analyse borrowing trends and inter-library loan requests (via the British Library's Document Supply Service) to predict future demand. This involves using predictive analytics to decide which books to acquire, how many copies are needed, and which low-use items can be moved to storage or ethically deaccessioned, ensuring the collection remains relevant and efficiently managed within space constraints.
- **Metadata and Database Management:** The creation and management of metadata—the data that describes resources—is a fundamentally logical and structured process akin to building a complex database. It requires precision and an understanding of relational models to ensure accurate and consistent tagging, which in turn powers faceted searching and filtering. This allows a user at the National Archives to narrow down millions of records by date, location, and subject with mathematical precision.

Statistical and Analytical Methods: Librarians employ descriptive statistics (means, medians, modes) to summarise service usage in annual reports. They use inferential statistics to test hypotheses, such as whether a new information literacy workshop has significantly improved students' grades. Data visualisation tools are then used to translate these mathematical findings into clear, compelling dashboards and reports for council members, university senates, or corporate directors, demonstrating the library's impact on key organisational goals.

KEY SKILLS & TOOLS

| Skill/Tool | Application |
|----------------------------------|---|
| Library Management Systems (LMS) | Librarians use UK-prevalent systems like Sierra or Alma to manage entire collections. Mathematically, they use the LMS to generate detailed usage reports, calculate key performance indicators (KPIs) like circulation rates, and manage fine-grained financial data for acquisitions and subscriptions. |
| | This is a primary tool for data analysis. Librarians use advanced functions (PivotTables, VLOOKUP), formulae, and charts to |

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| Excel/Google Sheets | analyse budget variances, model different subscription scenarios, and visualise user survey data to present to stakeholders in their local authority or university department. |
| SQL and Database Querying | Particularly in large or digital archives, librarians use SQL to write complex queries to extract specific datasets from institutional repositories. For example, querying all research outputs from a specific department published under a Gold Open Access scheme to ensure compliance with UKRI funding mandates. |
| Bibliometric Analysis Tools | Tools like Scopus, Web of Science, or InCites are used to perform quantitative analysis of research impact. Librarians at Russell Group universities calculate metrics like the h-index, Field-Weighted Citation Impact (FWCI), and journal impact factors to support the Research Excellence Framework (REF) submissions. |
| User Survey Platforms (e.g., Qualtrics) | Used to design and deploy user research. Librarians apply statistical sampling techniques and then use the platform's analysis tools to perform significance testing on the results, for instance, to determine if a new online resource is meeting user needs more effectively than the previous one. |
| Data Visualisation (e.g., Tableau, Power BI) | Used to communicate complex statistical findings in an accessible way. A public librarian might create a dashboard for council officials showing the correlation between library programme attendance and local indices of multiple deprivation, advocating for targeted funding. |
| Project Management Methodologies (PRINCE2) | While not a mathematical tool per se, project management requires strong numerical skills for budgeting, scheduling (Gantt charts), and resource allocation. This is essential for managing large-scale projects like a library refurbishment or a digital preservation initiative. |

Typical Pathway: The standard pathway begins with strong GCSEs (including Maths and English) and A-levels. Most professional librarian roles require a undergraduate degree in any subject, followed by a postgraduate qualification accredited by the Chartered Institute of Library and Information Professionals (CILIP), such as an MSc in Information Science or Librarianship from universities like Sheffield, Northumbria, or UCL. Many enter the field through graduate trainee schemes offered by prestigious institutions like Oxford or Cambridge. Career progression involves gaining experience in specialist areas (e.g., law, health, academia) and working towards

becoming a Chartered Member of CILIP (MCLIP). Senior roles include Library Manager, Head of Information Services, or Knowledge Manager within corporate firms, often requiring further management training and demonstrable experience in strategic budgeting and data-led service development.

Industry Demand: The UK job market for librarians is evolving, with demand shifting towards roles requiring strong digital data and information management skills. While traditional public library roles face budgetary pressures, there is growing demand within the corporate, legal, health, and STEM research sectors for information specialists. CILIP's reports highlight that skills in data analysis, digital preservation, and managing electronic resources are highly sought after. Professionals who can combine traditional information management expertise with strong quantitative and technological proficiencies have excellent career prospects.

Real-World Impact: Librarians are vital to the UK's knowledge economy and social fabric. They ensure the integrity and accessibility of the nation's cultural and scientific record, from preserving historical manuscripts at the National Library of Scotland to managing the data underpinning groundbreaking research at the Francis Crick Institute. In the public sector, they combat digital exclusion and support lifelong learning, directly contributing to community cohesion and individual wellbeing. Their mathematical and analytical work ensures that significant investments in information resources, from NHS evidence bases to university collections, are optimised for maximum public and organisational benefit.
