



University
of Glasgow

Computing science

Undergraduate study



The University's compact main campus combines grand historical buildings with up-to-the-minute facilities. It's centred on a neo-gothic building with a spire offering breathtaking views across the city.



Choose Glasgow

Introduction

The University of Glasgow is rated as one of the top 100 universities in the world (*Times Higher Education QS World University Rankings*).

All of our students study for degrees that are recognised and respected by employers throughout the world, but we can guarantee you will receive a lot more besides. Some of the key benefits of student life at Glasgow are

Satisfied students

Our students report high levels of satisfaction with their studies. According to the independent National Student Survey, an impressive 90% of the University's final-year students rated themselves as satisfied with their course in 2009, well above the national average of 81%.

Flexible course choices

We offer more than 900 degree programme combinations and our flexible system allows you to study a broad range of subjects during your time at university and, in many cases, makes it possible to delay choosing specialist subjects until the end of second year.

Teaching based on research

Glasgow is a research-led university, which means that you will be taught by academics at the forefront of knowledge in their subject areas.

A student experience worth having

You will take away more than a degree from Glasgow. Over the last 550 years our students have built up a fantastic array of initiatives to keep you engaged, entertained and energised. The result is a student experience to be proud of. We have

- four award-winning student media teams
- over 100 clubs and societies
- two undergraduate student unions
- sporting facilities for all levels of fitness
- a study abroad and exchange programme that offers opportunities to study across the world as part of your undergraduate degree.

All computing-related degrees at Glasgow include coverage of **software engineering principles and practice, programming in a variety of languages** focusing on advanced techniques, a broad range of **application development skills** including databases, user interfaces, web and e-commerce systems, and **system internals including advanced networking**.

Come and visit us

Open Day

www.glasgow.ac.uk/openday

In June and September we hold an Open Day to allow you, your family and teachers to visit us on campus and see a little of the city.

Open Day allows you to speak to academic staff, find out more about courses, tour the facilities, visit student accommodation and see for yourself what life would be like as a student at Glasgow. If you have a long way to travel you can also stay in one of our student residences.

Alternative visiting arrangements

Open Day is the best way for you to get a comprehensive picture of what being a student here would be like. However, if for any reason you can't make it on that date, then we will be able to make alternative arrangements.

To find out more visit:
www.glasgow.ac.uk/afternoonvisits.

Applicants' Visit Day

At Glasgow we go the extra mile. If you receive an offer of a place at Glasgow, we will invite you to visit us before making your final decision. Applicants' Visit Day usually takes place in March. Details will be sent to you together with your offer of a place.

Where can I find out more?

For full details of our courses please see our website: www.glasgow.ac.uk/computing.

If you have any questions, or you want to arrange a personal visit, you can contact, tel: +44 (0) 141 330 4256, email: advice@dcs.gla.ac.uk.



Computing Science

Degrees: BSc, MSci

Typical offer

Highers ABBB, including Maths and preferably with one other science subject

A-levels ABB, including Maths and preferably with one other science subject

IB 32 points including three science subjects

For entry requirements visit www.glasgow.ac.uk/undergraduate/degrees/entryrequirements

Computing science involves the study of elements of design, psychology, engineering and mathematics, set in the context of programming and its applications. The programme combines practical skills with fundamental concepts and knowledge.

Our courses are designed to help you gain skills such as understanding the requirements of users, creatively and carefully translating them into a programming language and checking to see that the programs work safely, reliably and as intended.

You will also study ways in which these principles can be applied, for example in databases, telecommunications, networks, graphics, information retrieval and human computer interaction.

You will begin programming from the point of view of practical problem-solving, fundamental to good program design. Every-day problems are broken down in stages until a solution can be constructed in the form of a program.

The courses we offer can change from year to year, but it may help you to know what is being offered at the moment.

Faster Route programmes

These might be of interest to you if you: are highly qualified at A-level or Advanced Higher level in relevant subjects; are motivated and keen to pursue a Science degree with maximum concentration on the subject; wish to complete your degree faster than the normal time frame.

For further information about entry requirements visit www.glasgow.ac.uk/undergraduate/degrees/entryrequirements.

What can I expect in first year?

Level-1 courses are:

- CS1P: an introductory programming course that emphasizes the principles of programming
- CS1Q: a coherent, comprehensive picture of computer and application software systems.

What can I expect in second year?

Level-2 courses are:

- Java programming 2
- Object oriented software engineering 2
- Data structures and algorithms 2
- Algorithmic foundations 2
- Computer systems 2
- Information management 2.

What happens next?

Honours

If you successfully complete the courses in first and second years, you may move on to Honours Computing Science (years three and four) which may be taken as Single Honours or as Combined Honours. In Combined Honours you divide your time between Computing Science and another subject that you have also studied in your first two years.

Level-3 courses are:

- Advanced programming 3
- Algorithmics 3
- Database systems 3
- Distributed information management
- Interactive systems 3
- Networked systems 3
- Operating systems 3
- Professional software development 3
- Programming languages 3
- Team project 3.

If you are studying Single Honours, you take all of these courses. If, however, you are studying for Combined Honours, you must take:

- Advanced programming
- Professional software development.

plus a selection of other courses of your own choice. Three of these will be computing courses, and six will be from your other subject.

In fourth year you will undertake a substantial individual project and the course:

- Professional skills and issues 4.

‘The quality of teaching in Computing Science is really excellent, it’s easy to learn and the lecturers are very friendly and approachable.’

Laura Murray, Computing Science student

‘Doing three subjects is not just helpful in making a decision of what area you wish to study. Statistics and Mathematics from first year keep cropping up in my Computing classes.’

Carly O’Neill, Computing Science student

‘Computing at Glasgow is an amazing experience from the beautiful scenery to the fantastic people you meet on the way. With ample support and a wide range of knowledge, there’s no doubt that you’ll find a job that interests you when you leave.’

Lauren Norrie, Computing Science student



Choose Glasgow

Combined Honours

You can choose to combine Computing Science with almost any other subject in the University, allowing you to pursue your other interests while gaining highly sought after technical skills that can be applied in virtually any job. Subjects you can study within a BSc or MA Combined Honours Degree in Computing Science include:

- Business & Management
- Business Economics
- Economics
- French
- Geography
- Mathematics
- Music.
- Philosophy
- Physics
- Physiology
- Politics
- Psychology
- Statistics.

You can also opt for Mathematical Sciences, which is a Combined Honours degree between Computing Science, Mathematics, and Statistics.

You will also choose a further eight options out of at least 16 courses. These may include:

- Advanced communications
- Algorithmics
- Artificial intelligence
- Compilers
- Computer architecture
- Computing science in the classroom
- Databases and internet technology
- Design and evaluation of multimedia systems
- Digital image processing
- Distributed algorithms and systems
- Enterprise computing
- Human computer interaction
- Information retrieval
- IT architecture (delivered by IBM)
- Modelling reactive systems
- Network communications technology
- Real time and embedded systems
- Safety critical systems
- Security & cryptography
- Software engineering processes.

Skills

Personal skills

Our degrees include team and solo projects. Computing is a people-focused subject and you will learn about, and be given the opportunity to practice, working with others. Teamwork is so crucial because most professional computing projects are carried out in partnership with other computing scientists, engineers, scientists or business analysts.

Essential skills include

- being able to interact with colleagues and clients
- being able to communicate ideas using reports and oral presentations
- attention to detail
- creating quality, reliable and safe applications.

Programming skills

Our aim is to ensure that our graduates

- are strong programmers in at least two languages
- have experience of different styles of language
- have the skills to quickly learn a new language.

At the moment we ensure that you leave our programme well-versed in programming in Python, Java and C. You may also study assembly language, Haskell (a functional language) and other languages, depending on which final year options you take. A variety of scripting languages and markup languages (like Javascript, HTML, XML) will also be encountered during your degree.

‘My studies helped lay a solid foundation for a career in financial services, government and telecommunications.’

Andrew McDonald graduated BSc in Computing Science in 1997 and PhD in 2004. He is currently working as a solutions architect for BT plc.

Software Engineering

Degrees: BSc, MSci

Typical offer

- Highers** ABBB, including Maths and preferably with one other science subject
- A-levels** ABB, including Maths and preferably with one other science subject
- IB** 32 points including three science subjects

For entry requirements visit www.glasgow.ac.uk/undergraduate/degrees/entryrequirements

Software Engineering is a major theme in computing science and involves the specification, design, construction and verification of large software systems. This degree programme is designed for computing science students who wish to pursue careers as professional software engineers in industry and commerce.

You will learn how to:

- engineer software to ensure that it is fit for purpose
- design and write software that is maintainable, so that other people can work with it, make changes to it in the future, and integrate it into much larger systems.

What can I expect in first, second and third years?

For the first three years (including third year Honours) you will study the same courses as for the degree programme in Computing Science.

If you progress to Honours, you will study courses which present a practical, design-oriented approach to computing. These courses cover software engineering itself and related topics such as databases, human computer interaction and real time systems.

Practical work is an essential part of the degree programme and in third year you will take part in a software engineering team project. You will also undertake a paid summer placement in industry in the UK or overseas of at least ten weeks' duration, between third and fourth years, which provides valuable work experience.

‘My degree at Glasgow not only gave me great technical depth and experience but also covered many skills that were easily transferable for use in the business world. I still use techniques from the degree in my daily life as an IT architect.’

Sharon Moore graduated in Software Engineering in 2001 and is currently working for IBM

www.glasgow.ac.uk/computing

Electronic & Software Engineering

Degrees: BEng, MEng, BSc

Typical offer for BSc

Highers ABBB, including Maths and preferably with one other science subject

A-levels ABB, including Maths and preferably with one other science subject

IB 32 points including three science subjects

Typical offer for BEng

Highers AABB including Maths and Physics at AB/BA

A-levels BBB including Maths and Physics

Typical offer for MEng

Highers AAAA or AAABB including Maths and Physics

A-levels ABB including Maths and Physics

For entry requirements visit www.glasgow.ac.uk/undergraduate/degrees/entryrequirements

This programme combines the study of both hardware and software and is taught jointly by computing scientists and engineers. It will give you a deep understanding of the knowledge required to lead the teams that will design and build the computerised systems of the future.

What can I expect in first year?

Your first year of study will include courses in:

- Electronics
- Electrical engineering
- Mathematics
- Computing science.

About a third of your time will be spent on the foundational analogue and digital electronics that you will use throughout your time at university and in your future career, with much of this time in the laboratory where you design, simulate and test circuits. You'll build some circuits too, but the emphasis is on understanding how electronic systems work, which will help you to design new ones.

Another third of the course will cover topics in mathematics. By the end of the year you will be able to apply calculations quickly to a whole range of real engineering problems.

The remaining third of the course will develop computer problem-solving skills that are applicable independent of any particular programming language. You will learn procedural and algorithmic program development (in Python) and gain a coherent picture of computer systems including:

- their structure
- human-computer interaction
- databases
- professional and ethical issues.

What happens in second and third years?

In second and third year you study a core of compulsory subjects, approximately 50% of which will be taught by computing scientists and the remainder by electrical engineers.

You will gain a thorough grounding in hardware and software aspects of computer systems, including:

- expertise in programming and software engineering using Java
- detailed knowledge of operating systems and networking
- a solid foundation in databases
- experience with electronic design software.

This is combined with a working knowledge of electrical circuit theory, analogue and digital electronic system design and digital communications. This means that at the end of three challenging years, you will possess the basic skills required of any professional electronics engineer or computing scientist, and will be developing your abilities to integrate both hardware and software to design new systems.

Practical work is an essential part of the degree programme. In third year you will take part in a team project combining elements of electronic and software engineering. You will also undertake a paid summer placement in industry in the UK or overseas of at least ten weeks duration, between third and fourth years, which provides valuable work experience.

What happens next?

In your final year, you will either study to gain a BEng or an MEng. Selection for the BEng, or transfer to the MEng is made at the end of third year and is based on your overall academic performance in your third year.

Whether you are a BEng or an MEng student, you will have a wide choice of technical options in fourth year, choosing half your specialist topics from electronics and electrical engineering topics and half from computing science topics.

MSci in Computing Science or Software Engineering

The MSci is a five-year degree in Computing Science or Software Engineering that builds on the corresponding four-year Honours degree. In both cases the aim is:

- to further equip you with an advanced and systematic understanding of selected areas of Computing Science or Software Engineering
- to provide the skills necessary to pursue independent research
- to prepare you for an academic or industrial research career.

The MSci will prepare you to pursue a successful career in research or advanced R&D after your postgraduate studies. Many MSci students publish research papers in international conferences and journals based on their project work.

All students are eligible to study for the MSci. As the programme follows the standard Honours route until the end of fourth year, you do not need to decide whether you wish to pursue it until the end of your third year.

What can I expect in Level-5?

As an MSci student you will take additional technical subjects and research training courses during your fifth year, with a major research project. Students on four-year Honours degrees are also allowed to take some of these courses during their final year.

Level 5 options include:

- Constraint programming
- Digital image processing
- Enterprise computing
- Information retrieval
- IT architecture (delivered by IBM)
- Machine learning
- Network multimedia systems
- Real time and embedded systems
- Types and programming languages.

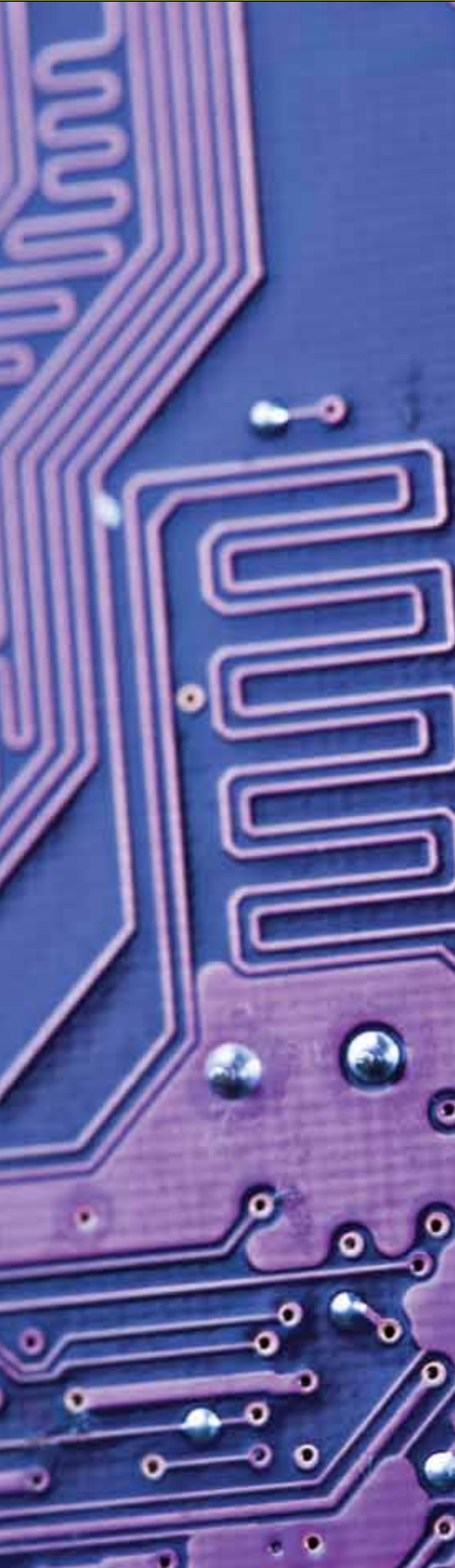
Level-5 core courses consist of:

- Research methods and techniques
- Research readings in computing science
- Advanced research readings
- A research proposal
- A major research project.

‘Glasgow has a good mix of teaching staff with academic depth and industrial experience. This gives students both points of view and is great for prompting interesting discussion and debate.’

Martin A Kerr, Electronic & Software Engineering student

Choose Glasgow



Electronics and electrical engineering topics include:

- VLSI design
- Robotics.

Computing science topics include:

- Artificial intelligence
- Software engineering processes
- Network communications.

You will also gain expertise in professional aspects including:

- Economics
- Project organisation
- Environmental issues
- Safety.

BEng

If you are a BEng student, you will complete your studies with a substantial individual project under one-to-one supervision with a member of academic staff. You may choose from a list of projects or propose a project of your own.

MEng

If you are admitted into the MEng route you will carry out a team project combined with a course in project management. You may also choose an appropriate European language course. You then complete a six month research and development project in an international company or research lab. If you have chosen to study a European language you may be assigned to a host organisation in Europe. Students choosing this option are considerably prized by future employers.

On return to Glasgow you will take a balance of further technical subjects including a course in advanced system design, and management subjects. If you would prefer, there is an option to concentrate on a comprehensive management course supported by many manufacturing companies in Scotland.

Mobile Software Engineering

Degrees: BSc

Typical offer

Highers ABBB, including Maths and preferably with one other science subject

A-levels ABB, including Maths and preferably with one other science subject

IB 32 points including three science subjects

For entry requirements visit www.glasgow.ac.uk/undergraduate/degrees/entryrequirements

This degree programme is designed for computing science students who wish to specialise in the development of software systems for mobile, embedded platforms such as mobile phones, personal digital assistants or portable entertainment systems, such as iPods.

What can I expect in first, second and third years?

For the first two years you will study the same courses as for the degree programme in Computing Science. For this degree programme we strongly recommend that students should study first year Mathematics.

If you progress to Honours, you will study courses that present a practical, design-oriented approach to computing; many of these courses will be shared with our Software Engineering programme. These courses cover software engineering itself and related topics such as embedded systems, databases, human computer interaction and real time systems.

Practical work is an essential part of the degree programme and in third year you will take part in a mobile software engineering team project, using state-of-the-art mobile computing equipment.

What happens next?

You will have the same choice of final year courses as software engineering students. Fourth year individual projects have a mobile software engineering focus and allow students to explore some topics in more depth.

‘IT provides a forever-changing environment and an exciting, rewarding career – not to mention a competitive salary.’

Maggie Hopkins, Computing Science BSc (Hons) graduate

www.glasgow.ac.uk/computing

Frequently asked questions

Why start with Python?

Python is both straightforward and powerful, making it valuable for beginners and experienced programmers alike. It allows simple problems to be solved using simple programs, which is often not the case with other languages such as Java, VB, C++ or C#. What's more, Python is being used increasingly in the web and systems programming world because of its extensive range of libraries.

What about C, C# and C++?

We've found that students who learn Java properly have no problem rapidly learning C during their third year. Our experience also shows that you will be able to master C# and C++ when needed. Employers, our graduates and work placement students all confirm that our teaching of Java and C provides a very strong platform for working in all four languages.

Why not just learn one language really well?

Almost every IT worker will use multiple languages during their career, making it vital for you to be able to adopt new approaches when needed. Our approach ensures you can learn new languages rapidly. Again, employers and our graduates report that this is one of the great strengths of our approach.

Will I be taught web programming?

You may notice that none of our courses has a name like 'Web programming'. This is because the skills you need to work on really powerful web-based systems are covered in several of our core and optional courses.

What about games programming?

Programming and engineering for computer games is a very specialist area. It requires some differences of approach from 'normal' programming, but builds on the same core skills. Glasgow graduates in the games industry tend to be those who excelled in the algorithms, programming and graphics areas. We do prepare you for such employment – but not to the exclusion of other larger employment sectors. In fact, games companies frequently take our students for placements and graduate employment and give positive input to our industrial advisory boards.

Can I study abroad?

We recommend that Computing Science and Software Engineering students who wish to study abroad do so during their second year and we have exchange agreements in place with a variety of internationally leading universities across Europe. You can also spend a year abroad in North America, Australasia or at strong universities in any other country. Your work placement between Levels 3 and 4 can be taken overseas and MEng students often spend their six months Level 5 placements in USA or mainland Europe.

The University holds a Study Abroad Fair every November. Information is also available on our website:
www.glasgow.ac.uk/studying/exchange.

What are my career prospects?

Our graduates are sought by a wide variety of companies ranging from small local software houses to the largest multinationals. We are closely linked with industry through our Computing Science Industrial Association and Industrial Advisory Board.

Our honours degrees have the added value of accreditation from The British Computer Society and the Institution of Engineering & Technology. The MEng degree is fully accredited by the Institution of Engineering & Technology, ensuring a speedy route to Chartered Engineer status.

Some of our graduates work for:

- international banks
- major computer manufacturers
- famous search engine companies
- large online booksellers.

At the other end of the spectrum, many of our graduates enjoy working for local startups and well-established Scottish companies.

Graduates of our degree in Electronics & Software Engineering are employed in:

- software houses
- electronics companies designing computer-based equipment
- commercial institutions such as banks and insurance companies.

Do I have to be a programmer?

You definitely do not have to be a programmer after you graduate. Many of our graduates choose to pursue other careers using their acquired skills in:

- problem solving techniques
- communication
- time management.

However, you will need to become a capable programmer during your degree. The team and individual projects and assessed coursework will help you to improve and then demonstrate your design, coding and engineering skills.

What about work experience and student placements?

We provide our students with excellent work experience opportunities. You may be able to work throughout the UK as well as in Europe and the US and many of the organisations who offer placements use the experience to get to know students well, which often leads to permanent job offers. Organisations who have employed our students include:

- IBM
- Amazon
- Memex
- Real Time
- Google
- Reuters
- JP Morgan
- Goldman Sachs
- Morgan Stanley.

Many of our work placements are in the financial industries. Our students have developed an excellent reputation in Scotland and London and competition between employers for our summer work placement students is high. Again, the core skills you require are all covered in our degree, and you can complement these by choosing business, economics or finance courses during Levels 1 and 2.

‘Scotland at its artsy, riotous, high-octane, good-time best.’

Lonely Planet



City of Glasgow

What is it like living and studying in Glasgow?

Named as one of the world’s top ten cities by independent travel guide *Lonely Planet*, Glasgow attracts the largest student population in Scotland. The city’s reputation for friendliness means that wherever you come from, you’ll soon treat it as your second home.

Music and nightlife

In an average week Glasgow hosts 123 bands, 72 classical composers, 49 choirs, 38 orchestras and 21 jazz bands. Renowned for discovering acts from Franz Ferdinand to Primal Scream, the city has fantastic venues for live music including King Tut’s Wah Wah Hut – voted UK’s best live venue by listeners of Radio 1 three years in a row.

More than 700 bars, pubs and nightclubs mean no two nights in Glasgow are the same. Whether you’re after a record-breaking 100-foot long bar where everyone can be a barfly (the Horseshoe), or a pub with a log fire, stuffed stags’ heads and kilted staff that’s as appealing as it is unpronounceable (Uisge Beatha), Glasgow has a venue to suit. Dance until you drop at the Subclub, or travel back to 1920s America at the Vegas clubnight on the Renfrew Ferry, it’s up to you.

Festivals

At least one festival every month of the year shows Glasgow loves to celebrate. Some of our favourites include Glasgow International Comedy Festival, Celtic Connections folk music festival, Glasgay, Piping Live!, Glasgow Film Festival and Aye Write!, the city’s book festival.

Culture

The city of Glasgow owns one of the richest collections in Europe, displayed in 13 museums and art galleries – and admission is free. You are spoilt for choice, with the city’s famous Burrell collection vying for attention beside Scotland’s most visited attraction, the Kelvingrove Art Gallery & Museum, located next door to the University.

Sport

The city will host the Commonwealth Games in 2014. Across the world people know Glasgow as home of Celtic and Rangers football clubs, but with no fewer than 27 public fitness centres including swimming pools, running tracks, 11-a-side pitches and tennis courts, you’re guaranteed to find something to get involved with, whatever your level of fitness.

Campus culture

Are you craving cosy campus living or do you prefer big city excitement. Whichever is your style, you’ll be impressed by the University’s excellent location in the compact West End. Just two miles from the city centre, with great bus and underground links, the West End has a reputation as the bohemian, trendy and cosmopolitan quarter of Glasgow.

What our students say

‘Glasgow is such a diverse and vibrant city with lots to offer and a great social scene with a fantastic range of bars, clubs and music venues.’

Alexander Hutchison

‘I chose Glasgow because compared to the other cities I visited it just seemed like a much more lively place. I think the high student population makes it a very young city.’

Elizabeth Ritz

‘The campus at Glasgow is unbelievably beautiful. It’s hard to believe sometimes when walking down busy Byres Road and turning into University Avenue, that this Hogwarts is situated right in the heart of the West End.’

Beverley Simpson

‘Glasgow is very vibrant. The West End is like the village within the city.’

Sarah Gibson

