Jubilee Campus

University of Nottingham—Nottingham, UK

Project Basics

Latitude/Longitude: 52°57'45" N/01°09'21"W

Climate: Temperate—Ruled by Ocean
"Britain does not have a climate, it only has weather."

Sunshine hours (yearly average): 230 hours

Building Type: Educational

Square Footage: +400,000 sq. ft. (includes a 20-acre brownfield site and 8 campus buildings)

Client: The University of Nottingham

Architect: Michael Hopkins and Partners

Engineer: Ove Arup & Partners

Landscape: Battle McCarthy

Funding Body: University of Nottingham
[Donated Funds: EU Thermie Grant

Design Process: 18 months

Build Time: Mar 1998–Sep 1999

Realization: 1999

Contract Value: £50 million

Construction Costs/Sq Ft: £140/sq. ft.

Total Energy Demand
Unit Floor Area: 85 Kwh/m^2/yr

Jubilee Campus is located about one mile from Nottingham University's main University Park Campus. Designed by architect Sir Michael Hopkins, Jubilee Campus won the 2000 BCIA award for "Building of the Year" and the 2001 "RIBA Journal Sustainability Award," among others. The campus name is derived from the fact that 1998 was the golden jubilee of the granting of the Royal Charter to the University that made it an independent degree-granting organization.

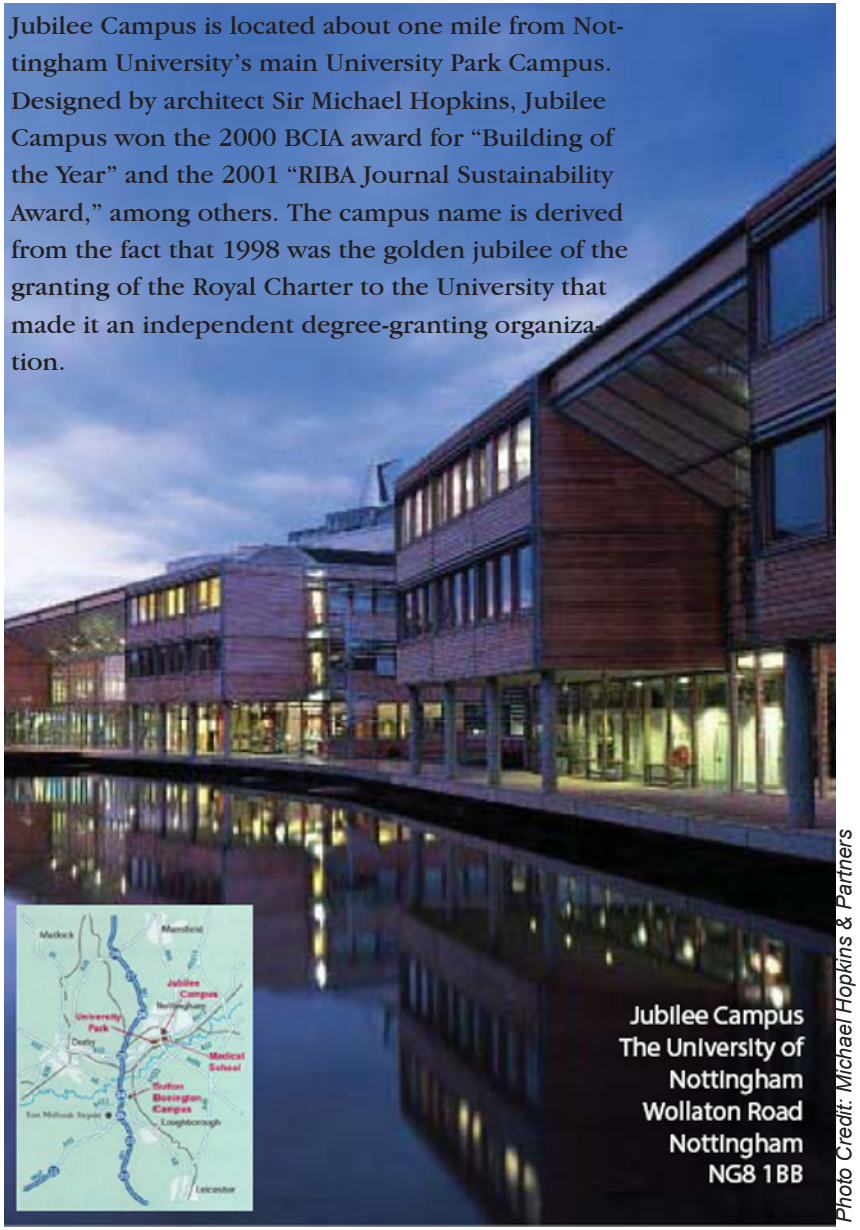


Photo Credit: Michael Hopkins & Partners

Where, When and Why

In 1996, the University of Nottingham held a competition for a major expansion to mark its 50th Anniversary. The RIBA-sponsored competition attracted over 100 entries, from which Hopkins and Partners were chosen to design the project.

Increases in student numbers and research workload during the 1990s could not be accommodated on the main parkland campus in the campus center: a new campus was required.

The competition brief required that the project meet the needs of around 1,000 students and staff, providing faculty buildings, teaching and support facilities, as well as residence halls for 150 post-graduate and 600 undergraduate students.

Image Credits: <http://www.nottingham.ac.uk/.../ images/jubilee-map.jpg>

Jubilee Campus

Background & Context

Jubilee Campus breathes new life into a linear brownfield site which was originally covered with factory buildings belonging to the Raleigh Bicycle Company. Now, the site is a sustainable academic park.

The 20-acre campus follows the old boundaries of Wollaton Park and the former Nottingham Canal. The main feature of the design scheme is an artificial lake which extends the full length of the site, providing a link to the main campus. A lakeside promenade is the primary pedestrian path, and the academic and teaching buildings face over the water. Nine principal buildings house academic schools, support units, and residence halls.

The prominent three-storey faculty buildings are similar in form, each consisting of three wings connected either by full-height, sloping, glazed atria or landscaped open courtyards. Vertical circulation within the buildings is provided in the back by circular stair towers which culminate in roof-mounted air-handling units. The eight gently moving cowls are prominent features of the site.

The landscaping is a key element of the architectural environmental systems. The landscape filters and cools the air approaching the buildings and even extends onto the roofs to improve insulation and prevent the build-up of reflected heat. Landscaping elements also purify the water running off roofs, roads, and parking areas. The lake that runs the length of the site serves as a collection point for all the rainwater runoff.

Another sustainable feature of the Jubilee Campus is that it is not located out of town, but within easy walking distance of the main UN campus and is well served by public transportation. In urban terms, the campus defines an edge and buffer between the bigger buildings of the town center and the suburban houses beyond the lake, situating the campus in a community context as well as a natural one.

All of this was achieved with buildings that cost only £140 per square foot. This proves that even architecture that exemplifies sustainability does not need to cost more than conventional buildings, yet will bring huge cost savings in the long-term, both in economic and environmental terms.

Green Design Concepts

Low energy/high performance
Replenishable resources
Recycling
Embodied energy
Long life
Loose fit
Total life cycle costing
Embedded in place
Access and urban context
Health and happiness
Community and connection

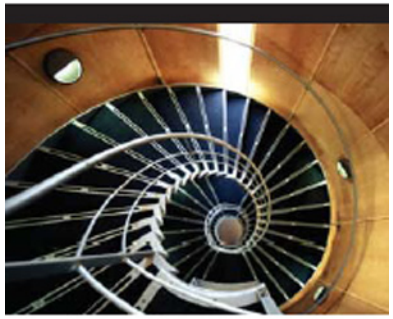


Photo Credit (top): Green Grand Tour
All other photos by Michael Hopkins & Partners.

Jubilee Campus

Design Intent and Strategy—Environment and Biodiversity

The university developed an environmental brief for the project that dictated that buildings should be naturally ventilated "whenever possible" and low-energy. All buildings on campus are designed to match or surpass this goal. The design of the buildings met the functional, quality, and environmental requirements to provide a comfortable working, learning, and teaching space. In the landscape design great care was taken to ensure the optimum use of an existing belt of mature trees at the far edge of the lake. The campus was carefully landscaped to encourage biodiversity by providing possible habitats, even extending to the roofs of the faculty buildings that were planted with moss and lichen to form thermally massive green roofs.

A colonnade on the front of the buildings forms the pedestrian route through the site. The colonnade provides views over the lake and gardens, but also engages the restaurants, shops, and atria meeting places at ground-floor level. Above the colonnade are the faculty rooms. The shapes of the free-standing, circular Learning Resource Centre Library and the conical lecture halls proclaim their importance. Halls of Residence have more privacy—those for undergraduates have a traditional courtyard layout; the postgraduate residence, crescent-shaped.

The campus has 312 banks of PV cells in the atria glazing that are prominent features of the faculty buildings and are sized to meet the energy demands of the ventilation systems within the buildings. Other major innovative features include rotating wind catchers that position the air exhaust so it is always under natural suction and thermal wheels that provide the most efficient heat exchange within the buildings. Jubilee Campus has low-energy lights throughout that are motion-activated as well as responsive to changing daylight levels.

Photo Credit: <http://www.oja-services.nl/iea-pvps/cases/gbr_01.htm>

Photo Credit: <http://www.oja-services.nl/iea-pvps/cases/gbr_01.htm>

Photo Credit: Michael Hopkins & Partners

Photo Credit: Michael Hopkins & Partners

Photo Credit: <http://www.nottingham.ac.uk/about/campuses/jubilee>

Jubilee Campus

Design Intent and Strategy—Ventilation

Photo Credit: <http://www.nottingham.ac.uk/about/campuses/jubilee>

Photo Credit: <http://www.oja-services.nl/iea-pvps/cases/gbr_01.htm>

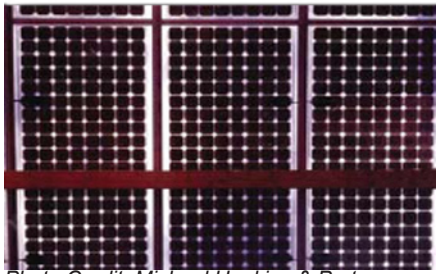


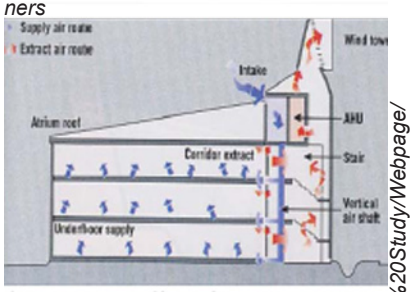
Photo Credit: Michael Hopkins & Partners

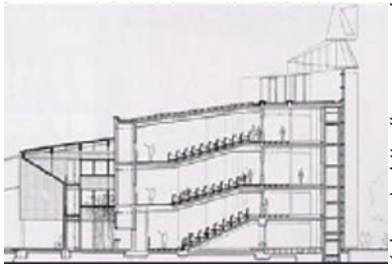
Arup devised a report on ventilation that was included in the successful application for an EU grant. The project received £750,000 under the Thermie programme, set up to support low-energy building services. It paid for PV cells and wind-catchers. The academic buildings are mechanically ventilated and heated using a low-pressure drop system that is more energy-efficient than natural ventilation.

Arup used its funded research into the design of the roof-mounts, a feature of the ventilation system. Air enters the air-handling units by suction, via the roof-mounts (wind-catchers) and then passes through an electrostatic filter. From here it is passed down the vertical air shafts, by fans, into the public areas. Air-handling units are powered by thermal wheels and indirect gas-fired heaters. The fans function by the use of the photovoltaic cells and circulate 100% fresh air. Exhaust air leaves via the stairwell and the corridors and eventually returns to the specially designed air-handling units for heat recovery. 312 photovoltaic cells placed in the glazed atrium roof are connected to the ventilation and cooling systems. The solar power is harnessed into the strings of the cells. The power then gathers into a switchboard and passes through an electrical conductor that mechanises the pump for the fans. These cells not only provide a clean energy that can meet the yearly requirements of the fans, but also provide the building with shade.

The design also made use of another source of sustainable energy in the form of a thermal mass of exposed concrete.

Photo Credit: Michael Hopkins & Partners





(above) <http://courses.arch.hku.hk/precedent/2001/JubileeCampus/Precedent%20Study/Webpage/Jubilee%20Campus_files/frame.htm>

Jubilee Campus

Design Intent and Strategy—Costs and Energy Savings

Program and costs were very tight, so the construction technology is simple emphasising refinement and rationalization of detail. The main three-storey buildings have simple on-site concrete framed structures. The external walls are clad in prefabricated red cedar panels with timber-framed windows. Full-height sloping glass atria, supported by laminated timber beams, interconnect the blocks. Glazed footbridges link the blocks to spiral staircases housed in timber-clad towers, topped with wind cowls.

Rigorous analysis of the site was performed during the design process to ensure maximum energy efficiency in all building systems. For example, the prevailing southwest winds are exploited; passive solar gains are optimized by the orientation of the buildings, providing views and pedestrian priority over vehicles.

The central teaching facility is one of the main teaching buildings facing the library. It has 3 progressively larger theatres stacked on top of each other. They seat 100, 200, and 300 students making maximum use of the building volume by being nested together, resulting in a minimum of wasted space beneath the steeply sloping seating.

Overall, the Jubilee Campus buildings are 60% more energy-efficient than those on the University Park Campus and are on target for the goal of "zero energy buildings." A measure of the success of this scheme is that despite initial resistance from the schools chosen to be moved from the main campus, they are now happy with, and even prefer, the new Jubilee Campus.

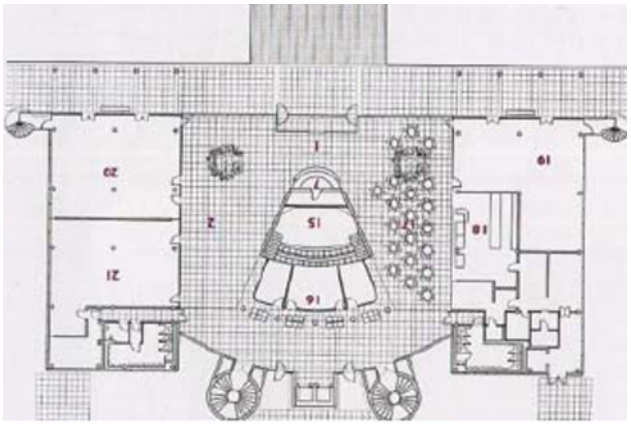


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Photo Credits: <http://www.courses.arch.hku.hk>

Photo Credits: <http://www.battlemccarthy.com/projects/education/uni_nott>

Photo Credits: <http://www.courses.arch.hku.hk>

Jubilee Campus

Design Intent and Strategy—More Sustainable Features

Other environmentally responsible features of the scheme include:

Warm-cell insulation, a substance made from recyclable paper, used in the walls of some of the buildings.

The wood used for the cedar cladding of the faculty buildings, from sustainable forests in Canada, was the most inexpensive available.

The buildings were created so natural lighting could enter some spaces and be deterred from others. In addition, there are light sensors that switch lights on when natural light dims and turn them off again when natural light is bright enough. There are no manually controlled light switches. Fixed louvres protect against solar gain and glare, and are assisted by the use of manually controlled blinds.

The acoustic recommendations for the buildings followed a Noise Impact Assessment carried out by Arup. The assessment focused on the disturbance made by traffic (one of the walls faces a busy road) and the light industrial works opposite the campus. The high noise levels of the dining area meant that the walls and floors of the Central Catering Facility had to be treated with an acoustic barrier. The walls of the lecture theatre are also insulated.

(both above) Photo Credit: Michael Hopkins & Partners

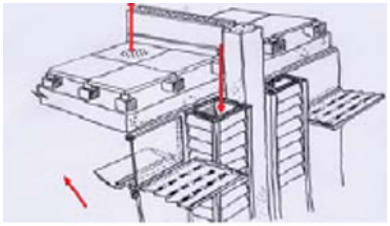

Photo Credit: <http://www.nottingham.ac.uk/about/campuses/jubilee>

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Jubilee Campus

Building Performance and Critique

Although the inverted cone of the Learning Resources Centre is considered the most dramatic architectural feature of the campus and is still regarded as its focal point, in daily use the spiral ramped circulation makes moving equipment difficult. In addition, the varying height step onto the spiralled ramp has proven to be a safety hazard.

The client's early scepticism about the use of prefabricated timber cladding has been overcome by the panel's excellent thermal performance. The client, however, is unhappy with the color and variable weathering of the panels. In spite of the zero weathering and no maintenance properties of Western Red Cedar, tests performed by the client have revealed that the cedar should be oiled to maintain its color and water resistance in the damp Nottingham climate.

In spite of these small flaws, the clarity and thoughtfulness of the design makes this project widely appreciated. The Judge's Citation for the Construction Industry Award reads:

"Highly sustainable design and immaculate construction have delivered a sophisticated but remarkably economical result. Students will be stimulated by the complex, which has established a new benchmark for university buildings."

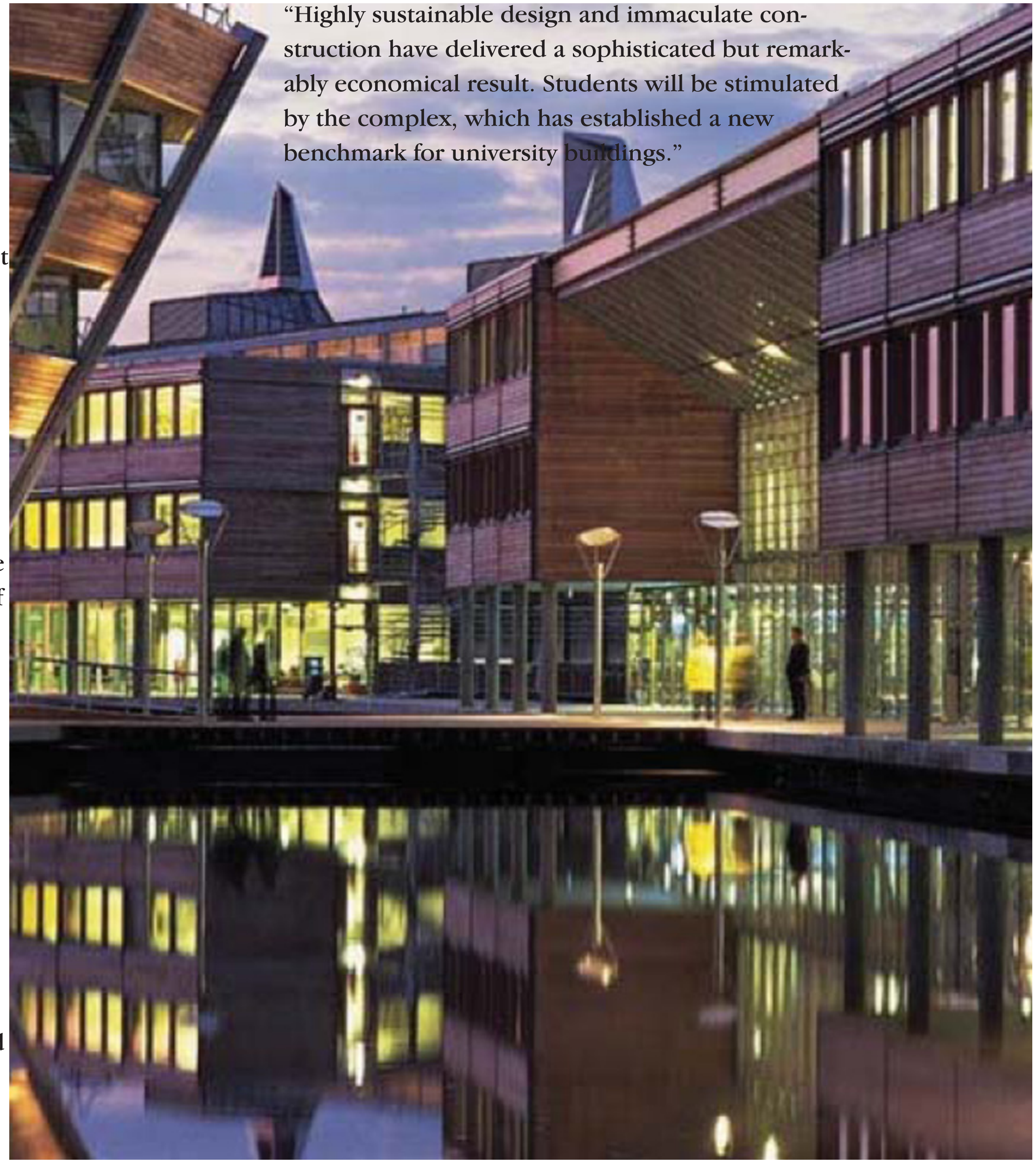

Photo Credit: Michael Hopkins & Partners

Further Information

Fawcett, P. "Campus Arcadia." *Architectural Review,* 2000.

Willmert, T. "The Return of Natural Ventilation." *Architectural Record*, 2001.

Awards

2000
Hot Dip Galvanising Awards

British Construction Industry Building Award

Nottingham Lord Mayor's Award

2001
RIBA Award

Aluminium Imagination Award Commendation

RIBA Journal Sustainability Award

UK Solar Award

2002
Energy Globe Award

Civic Trust Award for Sustainability Special Award

References

Cabe Library Case Study of Jubilee Campus. <http://www.cabe.org.uk/library/casestudy>

Case Studies : United Kingdom. <http://www.oja-services.nl/iea-pvps/cases/gbr_01.htm>

The Green Grand Tour. <http://www.coldhamarchitects.com/greenbuilding/greengrandtour/UK_Jubilee>

Hopkins Architects. <http://www.hopkins.co.uk>

Jubilee Campus Case Study. <http://courses.arch.hku.hk/precedent/2001/JubileeCampus/Precedent%20Study/Webpage/Jubilee%20Campus_files/frame.htm>

Jubilee Campus Tour Online. <http://www.nottingham.ac.uk/about/campuses/jubilee>

McCarthy, J et al. "Jubilee Campus, University of Nottingham." *The ARUP Journal* Feb 2001.

Map of Jubilee Campus. <http://www.nottingham.ac.uk/.../ images/jubilee-map.jpg>

Pendelton, K. "Green Agenda: Hopkins & Partners at Nottingham." *EcoTech Sustainable Architecture Today* Mar 1, 2000.

Wikipedia. <http://www.wikipedia.org>

Photo Credit: Michael Hopkins & Partners

Jubilee Campus

Transportation Route

Transport for London

TO NOTTINGHAM

Journey Planner

3. Route details

Journey summary

Departing: Tuesday 28 February 2006 at 07:43.
From: 229 Great Portland Street
To: Tottenham Campus
Restrictions:

Route 2

Time		Details		Information
07:40	start	**229 Great Portland Street**	start map	Transfer time: 5 mins
		Walk to Great Portland Street	end map	
07:45				
07:45		**Great Portland Street**	start map	Av journey time: 4 mins
		Take the Hammersmith & City Line towards King's Cross St.Pancras	end map	
07:49		or Metropolitan Line towards Aldgate	area map	
		or Circle Line towards King's Cross St.Pancras		
07:54		**Kings Cross Underground**	start map	Av journey time: 6 mins
		Take the Victoria Line towards Seven Sisters	end map	Zone(s): 1
08:00		or Victoria Line towards Walthamstow Central	area map	
08:01		**Finsbury Park**	start map	Av journey time: 7 mins
		Take the Piccadilly Line towards Arnos Grove	end map	Zone(s): 1, 2
08:08		or Piccadilly Line towards Cockfosters	area map	
		Wood Green	start map	Transfer time: 5 mins
		Walk to Wood Green Station	end map	
			area map	Zone(s): 2, 3
		Wood Green Station Stop: E	start map	Buses every: 6 - 7 mins
		Take the Bus W3 towards Northumberland Park	end map	Max journey time: 17 mins
08:31	end	**Tottenham Campus**		

Maximum journey time: 00:51
Interchanges: 3
Not what you expected? Click here for information on planned service disruptions
Please check ticket options and fare prices at http://www.tfl.gov.uk/faresandtickets

Travel by Train

Nottingham's train station is the nearest *major* railway station for the University. It is in the City Centre, about 3 miles from the Jubilee Campus. The station is served by Midland Mainline services from London St Pancras, Luton, Derby, and Sheffield. Central Trains services also run through from Norfolk, the east coast, Birmingham, Derby, Cardiff and Manchester. From the station you can either get a taxi to the University, or walk into the City to catch a bus. You'll need to get any "pink line" bus (numbers 28 to 32) - these leave every five minutes from Upper Parliament Street (outside Frankie and Bennys) or near Hurts Yard - download a map of the bus stops. The bus costs 90p to the Jubilee campus from the City and you'll need the correct change.

London	126 miles	2 hours 30 minutes

Case Study by Katie Ridge,
Spring 2006