

27th British Combinatorial Conference  
University of Birmingham  
29 July–2 August 2019

Abstracts and Information for Participants

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# Welcome

The British Combinatorial Committee and the local organisers are delighted to welcome you to the 27th British Combinatorial Conference, and hope that you have an enjoyable and informative week. This booklet contains information which we hope will be useful, including abstracts for all of the plenary lectures, minisymposia and contributed talks of the conference.

## Code of Conduct

All participants of this conference are required to agree with the following code of conduct. Organisers will enforce this code throughout the event. We expect cooperation from all participants to ensure a safe environment for everybody.

Our conference is dedicated to providing a harassment-free conference experience for everyone, regardless of gender, gender identity and expression, age, sexual orientation, disability, physical appearance, body size, race, ethnicity, or religion (or lack thereof). We do not tolerate harassment of conference participants in any form. Sexual language and imagery is not appropriate for any conference venue, including talks, breaks, meals, excursions and any online media. Conference participants violating these rules may be sanctioned or expelled from the conference at the discretion of the conference organisers.

If you are being harassed, notice that someone else is being harassed, or have any other concerns, please contact one of the local organisers immediately, and call university security or the police if appropriate (see below).

## Key contacts

Local Organisers:	Allan Lo	s.a.lo@bham.ac.uk
	Richard Mycroft	r.mycroft@bham.ac.uk
	Guillem Perarnau	g.perarnau@bham.ac.uk
	Andrew Treglown	a.c.treglown@bham.ac.uk
	<i>collectively</i>	bcc2019@contacts.bham.ac.uk
University Security:		0121 414 4444 (44444 from internal phones)
Police/Ambulance/Fire:	<i>emergency</i>	999
Police:	<i>non-emergency</i>	101

# Outline Schedule

A more detailed timetable should be included separately in your conference pack, but we hope the following outline may be useful for an overview. The 'code' following each activity is the location of the building on the campus map.

Monday	8:15–	Registration	R16
	9:00–9:15	Welcome	R19
	9:15–10:15	Plenary lecture	R19
	10:45–12:20	Contributed talks	R16
	13:55–14:55	Plenary lecture	R19
	15:25–17:25	Contributed talks	R16
	17:30–18:15	Problem session	R16
	18:30–	Welcome reception	R14
Tuesday	9:00–10:00	Plenary lecture	R19
	10:30–11:35	Minisymposia	R16
	11:40–12:00	Contributed talks	R16
	13:30–14:30	Plenary lecture	R19
	15:00–17:15	Minisymposia	R16
	17:20–18:20	BCC business meeting	R16
	19:45–	Concert/recital	R7
Wednesday	9:00–10:00	Plenary lecture	R19
	10:30–12:05	Contributed talks	R16
	13:20–17:00	Excursion	meet by R14
Thursday	9:00–10:00	Plenary lecture	R19
	10:30–11:35	Minisymposia	R16
	11:40–12:00	Contributed talks	R16
	13:30–14:30	Plenary lecture	R16
	15:00–17:15	Minisymposia	R16
	19:00–	Conference dinner	G23
Friday	9:00–10:00	Plenary lecture	R19
	10:30–12:05	Contributed talks	R16
	13:40–15:15	Contributed talks	R16
	15:50–16:50	Plenary lecture	R19

# Information for Participants

**Venues:** Most of the talks will take place in the Arts building (R16 on the campus map), but please be aware that all of the plenary lectures except for Thursday afternoon will be held in the Vaughan Jeffries lecture theatre, which is in a separate building, the School of Education (R19 on the campus map). It is only a short walk between the two buildings (see the map on page 16) but please allow time for this. Please note carefully that the Thursday afternoon plenary lecture will be in the Arts building.

**Wireless internet** should be available throughout the University of Birmingham campus. If you are an `eduroam` user then you should use this, otherwise please use `WiFiGuest`, which will ask you to register when you first connect to it.

**Tea and coffee** will be provided in the Mason Lounge on the ground floor of the Arts building (R16 on the campus map) during tea and coffee breaks.

**Lunches** for all participants will be provided in the Noble Room, on the second floor of the Staff House (R24 on the campus map). Please wear your conference badge so that participants can easily be identified.

**Welcome reception:** There will be a welcome reception for all participants at 18:30 on Monday evening, held at the Barber Institute of Fine Arts (R14 on the campus map). This will include the opportunity to take a guided tour of the gallery.

**Conference dinner:** For participants who registered for this, the dinner will begin with drinks at 19:00 on Thursday in the Edgbaston Park Hotel (G23 on the campus map).

**Evening meals** are not included in the conference registration (except the conference dinner for those who selected this option), but there are a range of options in the local area. You should have received a separate map with suggestions for this in your conference pack.

**Staff House bar:** This is located on the ground floor of the Staff House (R24 on the campus map) and we recommend it for drinks and light refreshments.

**Business meeting of the British Combinatorial Committee:** this will be held at 17:20 on Tuesday in Arts Main LT (in R16 on the campus map). We encourage all participants to attend. Please read the information about this on

pages 8–14, including the proposed amendments to the BCC constitution, and consider making nominations for the BCC committee on the nomination form included in your conference pack. These should be submitted by the end of lunch on Tuesday, either to the registration desk or directly to BCC secretary James Hirschfeld.

**Concert/Recital:** This will begin at 19:45 on Tuesday in Aston Webb Main LT (in R7 on the campus map). All conference participants are warmly invited to contribute to this (please bring your instruments with you for instrumental pieces). Those interested in taking part are asked to email David Penman at [dbpenman@essex.ac.uk](mailto:dbpenman@essex.ac.uk) – we are not selective!

**Excursion:** On the next page there is information about the Wednesday afternoon excursion for participants who registered for this, as well as other local attractions you might like to visit.

**Accommodation:** If you booked accommodation through the online shop, this is at Chamberlain, 37 Church Road, Birmingham B15 3AS (a little off the top of the campus map). The phone number is 0121 414 2838, check in is from 16:00 on day of arrival, and check out by 10:00 on day of departure. We suggest the footpath/cycleway marked in purple on the campus map as the nicest way to get between there and the conference.

**Transport:** University station, marked on the campus map, has 8+ trains per hour in the day to Birmingham New Street in the city centre (most also call at Five Ways, which is more convenient for accessing the clubs and bars on Broad Street). The last train back to University from Birmingham New Street departs at 23:33. Another option is to take buses X20 or X21, which call at the bus stops north of R29 and near G21 on the campus map, and also outside Birmingham New Street station. Buses do not give change but accept contactless payments.

**Taxi:** We recommend Castle Cars (0121 472 2222), which is the accredited taxi provider of the Guild of Students at the University of Birmingham. These should be pre-booked using the given phone number.

**Medical:** In the event of a medical emergency dial 999 for an ambulance or go to the Emergency Department at the Queen Elizabeth Hospital, which is located on the other side of University station from the university. For more minor ailments there is a walk-in NHS surgery in Selly Oak (15 Katie Road, B29 6JG) which is open 08:00–20:00 every day; you don't need to make an appointment in advance, but be warned that at busy times the waiting time to be seen can be a couple of hours.

## Excursion and Other Local Attractions

The conference excursion, for those participants who registered for this option, is to the **Black Country Living Museum** in Dudley, an award-winning open-air living museum which tells the story of the world's first industrial landscape. Coaches will depart for the museum from outside the Barber Institute (R14 on the campus map, pickup at the road by the east side of the building) at 13:20 on Wednesday 31st July – please do make sure you are there on time. Coaches will return to the University at around 17:00.

You may also be interested in visiting the following attractions in or close to the university (please check the relevant websites for opening times etc). There are many more things to see and do in Birmingham City Centre, see [visitbirmingham.com/things-to-see-and-do/attractions](http://visitbirmingham.com/things-to-see-and-do/attractions) for more information.

The **Barber Institute of Fine Arts** (R14 on the campus map) has been recognised as one of only five galleries outside London with “outstanding collections of international significance”, including works by Monet, Manet, Magritte, Renoir, Rubens, Rossetti, Rodin, Degas, Delacroix, Van Dyck, Botticelli, Poussin, Turner, Gainsborough, Gauguin and Van Gogh amongst others. Entrance is free.

The **Lapworth Museum of Geology** (R4 on the campus map) has galleries telling the story of the evolution of life and the planet over 4.5 billion years of Earth history; exhibits include dinosaur skeletons, fossils and minerals. Entrance is free.

**Winterbourne House and Garden** (G12 on the campus map). Winterbourne House, built in 1903, is a historic example of an Edwardian family home, including print wallpapers and period furnishings in the style of the “Arts and Crafts” movement. The 7-acre garden is notable as a rare surviving example of an early 20th-century high status suburban “villa” garden, and exhibits over 6000 plant species. Entrance is £7.20.

**Cadbury World** is Birmingham's premier tourist attraction. Located in the historic factory buildings of the Cadbury chocolate manufacturer, it gives an overview of the history of that company and an insight into how chocolate products are produced. The factory is a short well-signposted walk from Bournville station, which is five minutes by train from University station (alternatively a 30-minute walk along the canal towpath alongside the railway line). Admission prices vary, but it is cheaper to book online in advance or with a pre-printed voucher if travelling by train (see [www.daysoutguide.co.uk/cadbury-world](http://www.daysoutguide.co.uk/cadbury-world)).

# Business Meeting of the British Combinatorial Committee

The business meeting of the British Combinatorial Committee will be held at **17:20 on Tuesday 30th July** in **Arts Main LT** (in R16 on the campus map). All conference participants are encouraged to attend, and also to consider any nominations they wish to make for the elected positions of the committee. A separate nomination form should be included in your conference pack, along with an agenda for the meeting. Nominations should be submitted by the end of the Tuesday lunch break, either to the registration desk or directly to BCC Secretary James Hirschfeld, and can only be accepted at the business meeting if insufficient nominations have been received beforehand.

One key item of this year's meeting is a proposal to amend the constitution of the British Combinatorial Committee. Notes by Keith Edwards on the proposed changes are included below, followed by the proposed text of the amended constitution on pages 10–13.

The BCC accounts for the two years to July 2019 are presented on page 14.

## Notes on Proposed Changes to BCC Constitution

– by Keith Edwards, June 2019.

**Introduction:** There is a proposal to make some changes, largely procedural, to the Constitution of the British Combinatorial Committee. This note sets out the reasons for the proposed changes. The suggested changes have the support of the current committee members.

**Main changes:** There are three main changes which are proposed. These are listed below along with an explanation of the reasons for them.

1. The positions of Secretary and Treasurer should be chosen by separate elections at the Business Meeting (as currently happens for the committee Chair) instead of being chosen by the committee from among its members after the Business Meeting.

**Reason:** The main reason for this suggestion is to ensure that people willing to serve in these posts are elected to the committee. In 2017, after an election was held for membership of the committee, it was necessary to use co-option to fill the post of Secretary.



2. The Editor of the British Combinatorial Bulletin should no longer be an ex-officio member of the Committee.

**Reason:** It was felt by the committee that there was no particular reason why this post in particular should be ex-officio. Thus the only ex-officio position should be the local organiser of the next British Combinatorial Conference.

3. In addition to the Chair, Secretary and Treasurer, there should be between six and eight other elected committee members.

**Reason:** At the last two Business meetings there were more than six nominations for committee members. In 2015 the issue was fudged somewhat by agreeing that all those who wanted to join the committee could do so either as elected or co-opted members. This meant however that it was not clear which members were elected and which co-opted. In 2017, to avoid a repeat, an election was held. However, this was felt (at least by some) to be rather unsatisfactory, because there was a feeling that it was unfortunate that anyone offering to serve the community by joining the committee should then be rejected in the election.

Hence it is proposed to allow some elasticity in the size of the committee. The default is that there should be six elected members in addition to the Chair, Secretary and Treasurer, but that if up to eight nominations are received, all should be elected to the committee without a vote. However if more nominations are received, then six should be chosen by election. It is hoped that in this way elections can usually be avoided. It is also proposed that nominations for any of these positions should only be accepted at the Business Meeting itself if insufficient nominations have been received beforehand.

**Minor Changes** In addition, some minor changes are proposed. These are mainly intended to improve the wording, clarify the term of office of the local organisers and the postgraduate student representative, and remove some wording which seems outdated or unnecessarily precise.

# Constitution of the British Combinatorial Committee – Draft

## General Policy

1. The purpose of the Committee shall be to encourage the study of Combinatorial Mathematics.
2. The Committee shall aim to organize a British Combinatorial Conference every two years. The British Combinatorial Conferences shall aim to cover a wide range of topics in Combinatorial Mathematics. Any person who wishes to participate shall be able to do so on payment of the necessary fees and subject to confirmation of their *bona fides* at the discretion of the local conference organizer. There shall normally be some invited speakers whose expenses are paid. Each individual conference shall aim to be at least self-financing.
3. The Committee shall aim to gather and publish up-to-date information relevant to Combinatorial Mathematics in the U.K.
4. Any incidental surplus from the British Combinatorial Conferences and other activities may be invested and used for the general support of Combinatorics in the U.K. Priority shall be given to guaranteeing the continuation of the sequence of British Combinatorial Conferences and the sponsorship of one-day colloquia and the Postgraduate Combinatorial Conference.
5. The Committee and its Chair shall be empowered to act in accordance with the Rules appended.

## Rules

1. The Chair, Secretary, Treasurer and up to eight other members of the Committee shall be elected at a Business Meeting convened at each British Combinatorial Conference and shall discharge their duties until the next conference subject to the general consensus of the Business Meeting. In the event that the position of Chair, Secretary or Treasurer falls vacant between British Combinatorial Conferences, the committee may elect a replacement from among its members.

2. The local organizer of the next British Combinatorial Conference shall be an *ex-officio* member of the Committee effective from the Business meeting held at the previous conference.
3. The Committee shall have the power to co-opt up to three further members. These shall normally include the postgraduate student organizer of each Postgraduate Combinatorial Conference, whose term of membership shall be one year, starting from the date of the last committee meeting before the conference.
4. The committee may establish other positions with particular responsibilities and elect any of its members to such positions. Such positions shall usually include a Bulletin Editor responsible for gathering and publishing information relevant to Combinatorial Mathematics in the U.K.
5. The Committee shall meet during the Conference at which it is elected, and at other times as appropriate.
6. Accounts shall be prepared annually for the period 1 October to 30 September. They shall be examined and certified by a capable independent examiner and subsequently published.
7. The Committee shall be responsible for the arrangements for each British Combinatorial Conference, in particular (i) the choice of venue, (ii) the appointment of a local organizer, (iii) the choice of invited speakers, and (iv) the holding of the Business Meeting.
8. The constitution can be changed only by a two-thirds majority of those voting at a Business Meeting of a British Combinatorial Conference. The changes must have been notified in advance to participants at the Conference.
9. The Committee shall seek to fulfil its aims and functions with the consent and goodwill of the community of combinatorial mathematicians, and subject to the general consensus of opinion as expressed at Business Meetings of the British Combinatorial Conferences.

## **Procedures**

1. Holding of Business Meeting. A Business Meeting shall normally be held not later than the third day of each British Combinatorial Conference. Notice of the time and place of such meeting shall be provided to each participant upon his/her arrival. The notice shall include an outline agenda

and details of any proposed change in the constitution. It shall also include the Committee's nominations for Chair, Secretary and Treasurer of the British Combinatorial Committee for the period until the next British Combinatorial Conference, a nomination form and call for nominations to the British Combinatorial Committee.

2. Change of constitution. To be effective, a change of constitution must have been notified to all conference participants in writing as specified under (1) above and must subsequently have been passed by two-thirds of those voting at the Business Meeting. A proposed change or changes should, in the first instance, be communicated to the Secretary of the British Combinatorial Committee.
3. Nomination for membership of the Committee. Any combinatorial mathematician practising in the U.K. (including postgraduate research students) shall be eligible for membership of the Committee. Normally the retiring British Combinatorial Committee shall put forward nominations for Chair, Secretary and Treasurer. Further nominations for these posts and for the remaining committee members shall be invited before the Business Meeting up to a deadline to be specified on the nomination papers. Such nominations must be submitted on paper to the Secretary and must include the signatures of the Proposer and Secunder and consent of the nominee to serve if elected. A nomination for Chair, Secretary or Treasurer shall only be accepted at the Business Meeting itself if there is no other nomination for the post. For the remaining committee members, a nomination shall only be accepted at the Business Meeting if five or fewer nominations have been received, except that a candidate for Chair, Secretary or Treasurer who is not elected may choose to stand.
4. Election of the Chair, Secretary and Treasurer. Separate elections for each of the Chair, the Secretary, the Treasurer will be held at the Business Meeting. If only one nomination for a position is received, this position will be elected without a vote. Otherwise, voting shall be carried out as follows. Each person present at the Business Meeting will be given a blank lined ballot paper, and the consolidated list of candidates will be displayed at the meeting. Each person voting will enter the names of the candidates on his/her ballot paper in the order in which they are displayed, and will then vote by placing a cross against at most one candidate. The papers will be collected and counted. The candidate who receives the largest total will be declared elected. In the case of a tie, lots will be drawn.

5. Election of the remaining committee members. If eight or fewer nominations have been received for the remaining committee members, these positions will be elected without a vote. Otherwise voting shall be carried out as in Procedure 4 above, except each person will vote by placing a cross against at most six candidates. Those six candidates who receive the largest totals will be declared elected. In the case of a tie, lots will be drawn.
6. Winding up. In the event of the Committee being wound up, its assets shall be assigned to a British charity (or charities) with similar purposes, such charity (or charities) to be determined by the retiring Committee. The members of the Committee shall not be liable to contribute to the assets.

**BRITISH COMBINATORIAL COMMITTEE**

FINANCIAL STATEMENT, JULY 2019

**Twenty-sixth British Combinatorial Conference, University of Strathclyde, 2017 (BCC26)**

**Excess of income over expenditure                      £470.00**

**Income and expenditure account for period 1 October 2016 to 30 September 2018**

<b>Income</b>	£	<b>Expenditure</b>	£
Interest	42.71	One-day conferences	1667.09
Royalties from CUP	2835.69	London colloquia, 2017 & 2018	2505.47
Book sale at BCC26	405.00	Scottish Combinatorics Meetings, 2017 & 2018	895.12
Donation	10000.00	Postgraduate Combinatorial Conferences	164.70
		Finite Geometry Summer School, 2017	500.00
		"Interactions with Combinatorics", 2017	300.00
	<u>13283.40</u>		<u>6032.38</u>
Balance at 30 September 2016		17918.20	
Excess of income over expenditure		7251.02	
<b>Balance at 30 September 2018</b>		<b><u>£25169.22</u></b>	

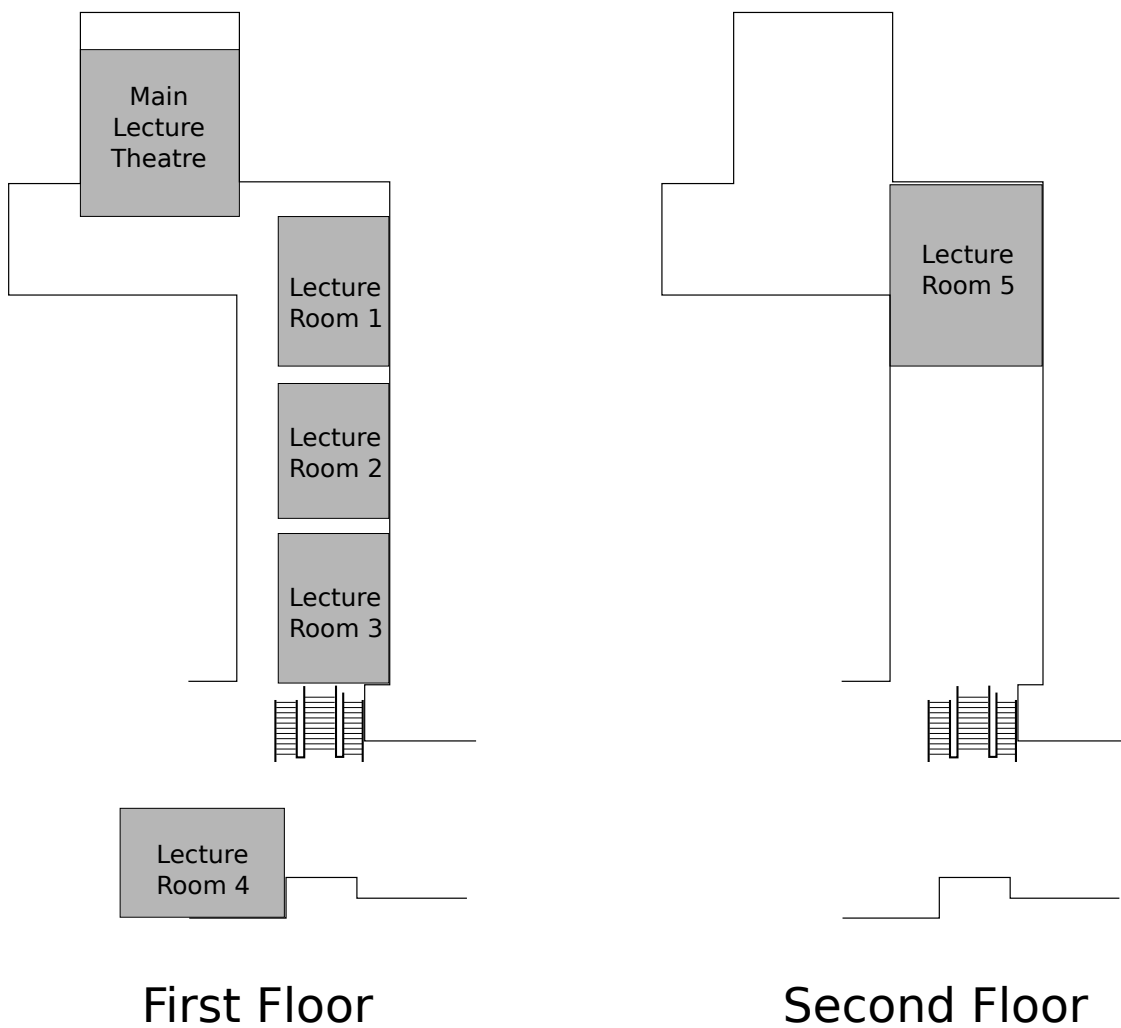
**Interim account for period 1 October 2018 to 31 May 2019**

<b>Income</b>	£	<b>Expenditure</b>	£
Interest	12.42	One-day conference	550.00
Royalties from CUP	499.65	Postgraduate Combinatorial Conference	500.00
Surplus from BCC26	470.00		
	<u>982.07</u>		<u>1050.00</u>
<b>Interim balance</b>		<b><u>£25101.29</u></b>	

Keith Edwards, Treasurer  
12 June 2019

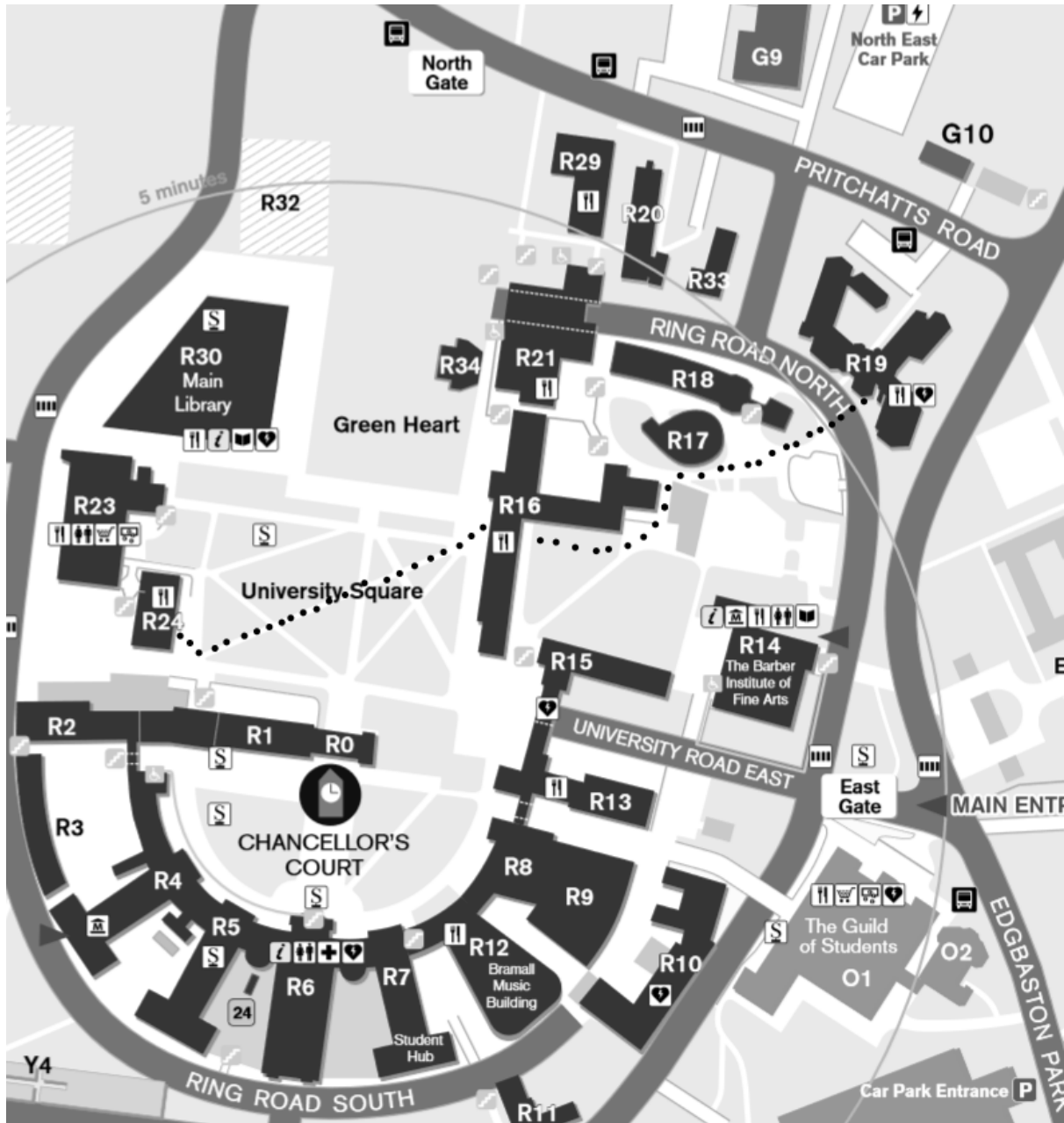
The British Combinatorial Committee is a charity registered in Scotland, No: SC019723

# Plan of Arts Building (R16)



Most talks will take place in the Arts Building (R16) on the conference map. The schematic diagram above shows how the rooms are located relative to each other.

# Plan of Inner Campus



The map above shows the central part of campus, and the dotted lines illustrate the walking routes between the Arts Building (R16, where most talks and tea and coffee breaks are), the School of Education (R19, where most plenary lectures are) and the Staff House (R24, where the lunches are).