UNIVERSITY OF BIRMINGHAM

CENTRE FOR DOCTORAL TRAINING IN TOPOLOGICAL DESIGN

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SUBMISSION OF RESEARCH PROJECTS FOR CDT PhD STUDENTS

# PhD PROJECT PROPOSAL

| **PhD PROJECT TITLE:** |  |
| --- | --- |

1. **PhD SUPERVISORY TEAM:**

| Principal Supervisor | *Please provide, name, email, School and Research Group* |
| --- | --- |
| Industrial Co-Supervisor | *Please provide, name, email, company division and location* |
| Associated Academics | *Please provide, name, email, School and Research Group. May be outside UoB.* |

1. **PhD PROJECT DETAILS**

| Project abstract |
| --- |
| *Should be accessible to potential students and EPS academics outside the discipline. Might be shared publicly on CDT website. Max. 100 words.* |
| How does the project utilise topology or topological design? |
| *Max. 100 words.* |

|  |
| --- |
| **How does your project relate to EPSRC’s 7 priorities?**   * **Physical and Mathematical Sciences Powerhouse** * **Frontiers in Engineering, Manufacturing and Technology** * **Digital Futures** * **Engineering Net Zero** * **AI, Digitisation and Data** * **Transforming Health and Healthcare** * **Quantum Technologies** |
| *Max 300 words.* |

1. **DETAILED PROJECT DESCRIPTION**

| *Information on the details required in this section can be found in the guidance below in point 3. This is circulated directly to students. Max. 1000 words including figures, diagrams and references.* |
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1. **POTENTIAL CO-FUNDING OR IN-KIND SUPPORT**

*Please read the Information Summary regarding this section.*

| Existing links to co-funding partners  Please list any existing co-funding sources that would be available to co-fund this this project. Please explain what the nature of the co-funding would be. |
| --- |
| Contact details in partner company or organisation  Please list the name, position and email address of a suitable contact representative in the potential partner company/organisation. |
| In-kind support from partner organisations  Please list any in-kind support that might be provided by a partner organisation. Please include both the nature of the support and the approximate value. |

1. **TRAINING PLAN DETAILS**

*Please read to Information Summary regarding this section.*

| M-Level module selection: *Please suggest 40 credits worth of M-Level EPS modules run annually in semesters 1 and 2 suitable for a student on this project, including the module title and code.* |
| --- |
| Mini-project 1 abstract: Supervisor name and email:  Description: *Please summarise what the student will do in this 10-credit project. Max. 200 words.* |
| Mini-project 2 abstract: Supervisor name and email:  Description: *Please summarise what the student will do in this 10-credit project. Max. 200 words.* |

1. **INTERNSHIP/PLACEMENT SUMMARY**

| *Max. 100 words* |
| --- |

1. **OTHER DETAILS**

| Please give the name of a UoB academic who could act as an expert assessor for the proposed project | *(Name, Group, School)* |
| --- | --- |
| Any other relevant issues about the project?(Optional) | *(e.g. necessary secondments at facilities outside UoB, significant research risks)* |

1. **SUGGESTED CONTRIBUTION TO THE CDT**

*Each academic supervisor is asked to indicate at least two roles s/he would be willing to undertake, with no more than one expected unless you would like to contribute more. Both Primary Supervisor (PS) and Co-Supervisor (CS) should indicate first (1st) and second (2nd) preferences). Supervisors will be expected to be part of the team assessing students they supervise on mini-projects.*

| Suggested contribution | PS | CS |
| --- | --- | --- |
| Supervise or assessing mini-projects (students take two in year 1) |  |  |
| Assist with CDT promotion events |  |  |
| Assist in organizing a CDT research area |  |  |

| Any other suggested contributions: |  |
| --- | --- |

Once completed, please upload as part of your completed [web form](file://eps-p-fs2-cif/eps/eps-school-intranets/physics-astronomy/cdt-td/phd-projects/Untitled.aspx).

# INFORMATION FOR PROSPECTIVE SUPERVISORS

## Overview

Students in the CDT for Topological Design (CDTTD) study for 4 years, consisting of a PhD with Integrated Study. We currently offer two pathways for students – our standard 1+3 programme where students complete the integrated study as a training year, and the 4-year pathway where the integrated study is completed over years 1-3 of the project. The 4-year pathway was introduced to meet the needs of projects where co-funding is provided by a partner company or organisation, who often prefer for research to start on the project in year 1. Students on co-funded projects are recruited specifically to that project, and are not permitted to change their projects during Year 1 as students on the 1+3 pathway can. This is due to the impact on CDT funding and partner relationships.

Co-funded PhD projects in the CDTTD must have two supervisors **one from the University and one from the industrial partner**. We also recommend that students have an associated academic from the University as part of the supervisory team. Ideally the associated academic is **from a different, independent research group**. The Principal Supervisor (PS) will have the main responsibility for monitoring and reporting the student’s progress, and the student will be a member of their research group, working within their offices and labs throughout the four years of the programme. The Co-Supervisor (CS) will have a significant input into the research and provide support and insight into liaising with the partner organisation. If students are required to work onsite at the partner organisation for extended periods of time, the industrial co-supervisor will need to ensure that they are available as the primary source of support for the student during these periods. The PS, CS and student are expected to meet regularly during the PhD. Prospective supervisors may only submit **one** project proposal as PS at a time, and will **cannot** supervise more than one student per cohort as the PS.

The research interests of the CDT in Topological Design are broad, involving the study and applications of Topology in its broadest sense. This involves researchers in every School in EPS, and beyond. Information on the existing research we fund, and research groups that we work with can be found [here](https://www.birmingham.ac.uk/university/colleges/eps/study/phd/cdt/topological-design-cdt/research-themes.aspx). A list of current industrial partners can be found [here](https://www.birmingham.ac.uk/university/colleges/eps/study/phd/cdt/topological-design-cdt/partnerships.aspx). Please include in your description of the project, any links to UoB research strategy, existing UKRI-funded research or existing research centres. Please also detail the general research area, e.g. metamaterials, soft matter, photonics, etc.

## Structure of the training programme

As a CDT, all students must complete a training programme as part of their PhD with Integrated Study. Our students complete this training between years 1-3, in a tapered fashion to support the students’ development as researchers.

The training programme offers a combination of CDT-specific training modules of cohort-based learning, covering a background in mathematical topology, responsible research and innovation, and computing and data skills. In addition, students begin their professional development as researchers, including writing papers, posters and proposals, and presenting to expert and general audiences.

The 120 credits are structured as follows:

* 40 credits of CDT-based technical training modules.
* 40 credits worth of M-level modules from any School in EPS – 20 credits of semester 1 modules, and 20 credits of semester 2 modules. The mix of modules chosen is unique to each student, allowing them to broaden their undergraduate background beyond topics in their undergraduate degree. At least one of these modules must be from outside their undergraduate background. Students must engage with all relevant lectures and workshops for the module, but will not participate in the modules’ assessments. This material is assessed within the CDT.
* 20 credits of research skills training, including a mandatory RRI module.
* 40 credits of research training consisting of two 10-credit mini-projects and a 20-credit research bridging project.
* Additional optional uncredited training in a variety of professional development skills.

For more information on the programme, please contact us at [cdt-topologicaldesign@contacts.bham.ac.uk](mailto:cdt-topologicaldesign@contacts.bham.ac.uk).

To ensure that students develop the requisite skills to support their PhD research, please identify modules that you would recommend they take to develop the knowledge, background and skills relevant to your project.

# Completing the project proposal form

## General Notes

Please be aware that the CDT does not have resource to support research expenses beyond the following:

* Post-doc level University laptop issued for student’s exclusive use in Years 1-4.
* RTSG support for conference costs, minor equipment costs, consumables, etc.
* Hot-desk workspace in the CDT offices available from Years 1-4.
* Access to CDT video conference facility for liaison with collaborators and academic partners in their research project.
* Full professional development support from Years 1-4.

Bench fees and equipment costs will need to be funded either through your research group or School funds, or from an industrial partner. Periodically, the CDT may receive additional funding from EPSRC to purchase equipment and software for our students, and we will always seek the advice of supervisors in how these resources are spent. However, this funding is not guaranteed and cannot be used to benefit individual students.

CDT students are dual registered in both the School of Physics and Astronomy, and in the School where their research group is spaced. They will be expected to have at least hot desking space in your research group to allow them to participate fully in the normal research activity of PhD students in the College of EPS. We strongly advise that you discuss the application for a CDT studentship with your Head of Research, academic PGR lead and/or Head of Operations to ensure that adequate housing can be provided for them, if you are successful in receiving a studentship.

## Project Supervisory Team:

Please enter the name and contact details for Principal Supervisor (PS), Co-Supervisor (CS), any associated academics (AA) from UoB or another institution.

## Project Details:

Please include:

* Project abstract (up to 200 words, to be accessible for a general audience).
* A summary of how the project utilises topology (up to 100 words).
* Relationship of this project to the EPSRC strategic priorities.

## Detailed Project Description:

Please use this section to provide a detailed description of the project, with a maximum word limit of 1000 words including figures, diagrams and references. The description should include:

* Research background, intended outcomes and methodology;
* Training and skills to be developed over the PhD;
* Explanation of why the project is suitable for the CDT in Topological Design;
* Links with research in the research groups of the supervising team;
* Links with research strategies, possibly including UoB, EPSRC, partner organisations;
* An ideal/acceptable undergraduate background and interests. It is suggested you prepare the proposal with such a student in mind as a reader.

## Potential Co-Funding or In-Kind Support

Please use this section to detail links with co-funders for the project. These may include new industrial partnerships, non-UKRI research funders or funds from existing industrially-funded research grants. Co-funding can be split between a number of different partners.

Please include the following details:

* Name of each co-funding partner, including the grant number if the proposed co-funding comes from an existing research project.
* Details of the co-funding that has been initially proposed.
* The name and email address of an appropriate contact in the company or organisation.
* Details of the kind of support the organisation can offer. This can consist of mentoring of students, specialist training, and access to equipment or labs.

## Training Plan Details

* 1. M-Level Modules:

Please suggest suitable UoB M-level modules (or H-level modules in exceptional circumstances) taught in semester 1 and 2 with the value of 30 credits for each semester. A full list of available modules can be found at <https://program-and-modules-handbook.bham.ac.uk/webhandbooks/WebHandbooks-control-servlet?Action=getSchoolList>.

* 1. Mini-Project 1:

Please provide an abstract for mini-project 1. The abstract must include the name and email of the project supervisor, and a description of the project.

The project should develop the student’s research background and skills, and should include some element of new work, possibly as a ‘feasibility study’ (e.g. numerical calculation or simple data analysis). Please indicate whether this project will develop the student’s theoretical, experimental or computational skills.

1. Mini-Project 2

Please provide an abstract for mini-project 2. The project should develop the research background and skills for the full PhD project, and should include some element of new work. The abstract must include the name and email of the project supervisor and a description of the project.

This second project should complement mini-Project 1 by training students in additional research skills, i.e. if project 1 was theoretical, project 2 should be experimental or computational in nature. Students must also have the opportunity to join a different research group to mini-project 1. It is expected that the PS will supervise this project, and should introduce the research background and methodology of the main PhD project.

## **Internship/Placement Summary**

Please include a suggestion for an internship for 3 months during years 2-4 (up to 100 words). This should ideally be completed with the industrial co-funder. If a different company or organisation will host the internship, please specify who they will be and why they are the preferred host over the existing industrial partner.

Students will continue to receive their normal monthly stipend payments for the duration of the internship, so there is no need for host companies to pay a salary to the students during their time with them. However, we do ask that companies pay accommodation/travel expenses to the students (up to £800 per calendar month, sum to be based on the norms for that geographical region).

## **Other details:**

Please include details of a potential UoB assessor who might be approached to comment on your proposal, and any other relevant issues (e.g. necessary access to non-UoB facilities).

1. Suggested contribution to the CDT:

All academic supervisors of successful PhD projects are expected to contribute to the delivery of the CDT, either by teaching/training/assessment, or in management where appropriate. We attach a checklist of possible ways of getting involved. Other suggestions on how you would like to be involved would be very welcome.

## Next Steps

Proposed projects will be assessed for scientific merit, for their development of UoB research in Topological Design and developing/strengthening links with partner organisations. If you are unsure about any elements of this process, please contact the CDT Head of Operations and Development, Dr Hannah Roberts ([h.c.roberts@bham.ac.uk](mailto:h.c.roberts@bham.ac.uk)) or the CDT Director, Professor Mark Dennis ([m.r.dennis@bham.ac.uk](file:///C:/Users/roberthc/AppData/Local/Microsoft/Windows/INetCache/Content.Outlook/KMGEFQOX/m.r.dennis@bham.ac.uk)) for advice and suggestions. Please get in touch with any questions – we want all submitted projects to be in a suitable form to be offered to our incoming cohort. We will provide feedback on all projects submitted. Successful proposals will be advertised individually to attract students interested in industrially-focused projects. Suitable students will be identified through consultation with the PS and interviews will be undertaken jointly by the CDT and supervisory team, with appropriate input from co-funders.