# Job Description – EPSRC DTP Internship: General Position in Networks

*“EPSRC’s Vacation Internships scheme gives undergraduate students a taster of what it is like to do research. The students are given practical, first-hand experience of working on and carrying out research in a UK university.”*

Source: [Internships and placements – UKRI](https://www.ukri.org/councils/epsrc/career-and-skills-development/studentships/flexibility-for-funders/internships-and-placements/)

To be eligible for an EPSRC Vacation Internship you **must**:

* be an undergraduate or Masters student in a STEM subject area.
* not have completed your degree studies before the planned end of the internship. An internship should generally take place in the summer vacation **before** your final year of study.
* have a right to work in the UK and carry out the placement whilst resident in the UK. We are **not** able to sponsor visas for the internship.

**About the Role**

The origin of the general position problem is a puzzle by Henry Dudeney: how many pawns can be placed on a n times n chessboard such that no three pawns lie on a common straight line in the plane? This problem was later generalised to objects called graphs, which are mathematical models of networks consisting of vertices connected by edges. Imagine a set of robots on the network that communicate with one another by sending signals along shortest paths between them; then we desire to find the largest number of robots that can be placed in the network without disturbing communication.

Research on this subject has exploded in the last decade. The student will be helping to investigate some variations on this problem, depending on their interests. These include a dynamic version of the problem, in which the robot must visit all the vertices of the graph whilst remaining in general position, worst case scenarios of algorithms that produce general position type sets, general position games and optimal ways to destroy the general position property.

The student will experience all aspects of research life, including writing papers, making research presentations and, most importantly, finding ways through difficult problems when stuck! They will also be able to collaborate with other researchers and students.

The role will develop skills and experience in:

* Performing independent and novel mathematical research.
* Presenting their research in public.
* Academic writing.
* Collaboration in small groups.

**About the Unit**

The School of Mathematics and Statistics has research groups in combinatorics, dynamical systems, complex analysis, history of mathematics, statistics, applied mathematics and mathematics education. The combinatorics group consists of 14 researchers and 4 PhD students. Particular strengths of the group include design theory, combinatorics of permutations, the degree/diameter and degree/girth problems, topological graph theory and probabilistic combinatorics. The immediate group of the supervisor has strong links with departments in Slovenia, Indonesia, Spain, India and Slovakia.

**Key Responsibilities**

* Review key literature and undertake new research with guidance from supervisor.
* Assist in formalising and writing proofs, potentially in the form of academic papers.
* Giving presentations and updates on their research.

**Skills and experience**

Essential:

* Familiarity with reading and constructing mathematical proofs.
* High grades in previous mathematical studies.
* Excellent skills in basic areas of mathematics, e.g. linear algebra, number theory, group theory.
* Access to a computer/laptop, the Internet and Microsoft Office applications

Desirable:

* Prior knowledge of combinatorics.
* Programming skills.

If you would like further details about the role before making an application, then please email [stem-research-student-support@open.ac.uk](mailto:stem-research-student-support@open.ac.uk) quoting the reference number and job title.