# What is NEXUSS?

NEXUSS (Next Generation Unmanned Systems Science) is a Centre for Doctoral Training funded by NERC and EPSRC for 3 cohorts of postgraduate students. Students are funded for 3 years 8 months for full-time postgraduate research on the use of Smart and Autonomous Observing Systems (SAOS) for environmental sciences within the NERC remit. All PhD students have a supervisory panel that comprises supervisors from at least two (2) of the Core Partners and at least one (1) supervisor in the sciences and one (1) engineering.

NEXUSS expect a submission of thesis by 48 months of candidature.

Cohort 1 started in September 2016 and comprises 11 students from Core Partners and St. Andrews.

Cohort 2 started in September 2017 and comprises 19 students from Core Partners and University of Bath, University of Exeter.

Cohort 3 started in September 2018 and comprises 16 students from Core Partners and University of Exeter. Within this year we also have an associated student (externally funded) and an affiliated student (paying NEXUSS a contribution to partake in the training).

## A SAOS (Smart and Autonomous Observing Systems) PhD

The PhD projects that NEXUSS students are engaged in may differ from traditional science or traditional engineering PhD projects.  This means that outputs from these PhDs will not be restricted to scientific discoveries, nor to technological novelty as long as they demonstrate novelty and advancement in the development and use of autonomous systems for environmental science.  The NEXUSS CDT firmly supports the idea of PhDs that are multidisciplinary and transdisciplinary be this a blend of traditional science and traditional engineering, or permutations and combinations of: novel technology development, adaptation, application, demonstration, novel science methods or discoveries. The NEXUSS CDT expects that advisory panels will adjust expectations to account for this approach, while still upholding their host institution’s requirement for what constitutes a PhD.

## Core partners (6):

* British Antarctic Survey (BAS),
* Heriot Watt University (HWU),
* National Oceanography Centre (NOC),
* Scottish Association for Marine Sciences (SAMS),
* University of East Anglia (UEA),
* University of Southampton (UoS)

## Associate partners (3):

* Bath University
* St Andrews
* University of Exeter

Associate partners typically contribute 50% of the studentship costs.

# NEXUSS Executive Steering Committee (NESC)

The NEXUSS Executive Steering Committee includes representation from each of the core partners and a director (UoS). Steering Committee meetings occur quarterly, and occasionally more frequently (e.g., during recruitment periods). For more information see <https://www.southampton.ac.uk/nexuss/about/nexuss-executive-steering-committee.page>

NEXUSS Management Team

The NEXUSS Management team are responsible for the day-to-day running of NEXUSS. For membership and areas of responsibility, please see <https://www.southampton.ac.uk/nexuss/about/nexuss-management-team.page>

## Contact:

* If you are at one of the Core Partner institutions, please contact your local steering committee representative in the first instance. <https://www.southampton.ac.uk/nexuss/about/nexuss-executive-steering-committee.page>
* If you are at an associate partner institution, please contact [nexuss@soton.ac.uk](mailto:nexuss@soton.ac.uk)
* If you are a student, please contact [nexuss@soton.ac.uk](mailto:nexuss@soton.ac.uk). You may also communicate via the student representatives on the Steering Committee if, for example, you would like to maintain anonymity. (<https://www.southampton.ac.uk/nexuss/about/nexuss-executive-steering-committee.page>)

## Online presence

## Website

NEXUSS has a website at <https://www.southampton.ac.uk/nexuss/index.page>

It contains information regarding the current management team, steering committee members, and for current staff and students. PhD projects advertised are linked from here, and research experience placements are advertised.

**Twitter**

For twitter, we use the hashtag #nexuss. If you are setting up a personal twitter account, we recommend checking some resources on how to get started with twitter (e.g., <https://onlineacademic.wordpress.com/social-media-for-academics/twitter-for-academics/>)

**Facebook**

There is also a Facebook page for current students to communicate with each other and NEXUSS. It is a closed group and therefore private.

# Expectations for supervisors

## Progression

You are responsible for supervising your PhD students’ research project and career development, upholding the [Vitae Research Development Statement](https://www.vitae.ac.uk/vitae-publications/rdf-related/researcher-development-statement-rds-vitae.pdf). Progression rules must be adhered to as stipulated by the students registered institution rules and regulations. In addition to this, supervisors are responsible for ensuring that the students training needs analysis is continually monitored and any gaps in training addressed appropriately. All formal reports should be available both to the NEXUSS CDT director and to the host graduate school. These procedures are in line with the HEFCE PGR QAA guidelines.

**Change of supervisory team**

If through monitoring progress, the PhD project diverges strongly from the originally proposed project, or supervisory team undergoes changes, you are required to apprise NEXUSS of the changes ([nexuss@soton.ac.uk](mailto:nexuss@soton.ac.uk)). All lead supervisors must provide a 2-page CV to the NEXUSS manager ([nexuss@soton.ac.uk](mailto:nexuss@soton.ac.uk)) as the NEXUSS CDT only permits scientists/engineers with a high REF2014 standard to supervise and advise CDT students.

**CASE partners**

Supervisors are expected to follow up with CASE partners for your student, including the £1000/year investment by the CASE partner into your student’s RTSG fund. CASE partners may be secured after the studentship has been agreed or begun. Studentships with CASE support are prioritised at recruitment, so if the CASE partnership does not materialise, NEXUSS should be informed.

**Commitment to NEXUSS Training**

In addition, supervisors are expected to support NEXUSS by encouraging their student to attend NEXUSS training. NEXUSS-funded training modules (listed below) are *compulsory* for NEXUSS-funded students. Repeated failure to attend training will be charged to the student’s RTSG. Supervisors should also encourage their students to participate in additional NEXUSS events e.g., with industry partners, and to contribute to the NEXUSS training, reporting and management. The NEXUSS CDT included limited funds for administration of the programme. While we are actively seeking additional sponsorship (and would welcome leads in this regard), we rely on contributions from partners to deliver the NEXUSS programme to students.

For the purposes of reporting, we will ask annually for information regarding:

* Success stories and impact (the wider effect of the DTP in your organisation or local/national community)
* Relationships developed with end-users that may lead to future collaborative projects (e.g., with industry partners)
* Any training activities your student has engaged with including with non-academic training partners (e.g., placements)
* Any additional investments received for your student’s project or related, either cash or in-kind.

We ask that you respond in a timely manner to requests for information from the NEXUSS management or your local steering committee representative.

# Expectations for students

*In addition to working full-time to complete your PhD* (unless alternate arrangements have been made), students are responsible for

* Participating in the NEXUSS training programme. As part of the NEXUSS CDT studentship agreement, students have agreed to attend all compulsory events, including: Induction, 3 foundation modules, 2 second year modules, and a final year module, and the Grand Challenge and SAOS conference. While each module may not be of direct relevance to your PhD, these are designed to give you a breadth of working knowledge in SAOS and to build community within your cohort. Repeated failure to attend training diminishes cohort cohesion and will result in the cost of the training being charged to the student’s RTSG. Approved absences (e.g., for fieldwork necessary for the PhD) may be considered.
* Completing feedback questionnaires regarding the training, so that we may evaluate and adjust the training to better suit your needs.
* Responding in a timely manner to requests for information for the NEXUSS website, annual reporting to NERC, and regarding their PhD progress.
* Managing your Research Training and Support Grant (RTSG).

Additionally, you are encouraged to avail yourself of other training and learning opportunities under the guidance of your advisory panel, e.g., MSc-level course at your host institution (or partner institution) and NERC funded training opportunities.

During your PhD, you are requested to inform NEXUSS of successes including, but not limited to:

* High-profile scientific achievements and publications
* Career destinations
* Patents and commercialisation opportunities
* Translation of research output into business, industry and policy
* Online presence of yourself in relation to your NEXUSS research, e.g. blog articles, news releases, or video clips.

You are also invited to provide feedback on NEXUSS, NEXUSS training, or other aspects in the domain of NEXUSS and related to your PhD or career development. You may do this directly to [nexuss@soton.ac.uk](mailto:nexuss@soton.ac.uk), through your student representatives, or in the feedback forms that follow training activities.

# NEXUSS training programme

Foundation modules serve as an introduction to SAOS approaches to environmental science, and give you hands-on experience with these technologies. Second year modules focus on professional skills development; final year modules prepare you for the next steps. Travel and subsistence associated with these training modules is covered out of a central NEXUSS fund and not the student’s RTSG (<https://www.southampton.ac.uk/nexuss/students-and-staff/claiming-expenses.page>). NEXUSS core training is *compulsory*; in exceptional circumstances (e.g., fieldwork central to a student’s PhD research or medical issues), students may miss training events or join the training event alongside the following cohort.

The NEXUSS CDT training programme is outlined below. It is subject to change based on demand and feedback. Update-to-date information and course content can be found on the NEXUSS website: <https://www.southampton.ac.uk/nexuss/programme/training.page>

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| **Year 1 –** The first year is made up of 3 Foundation Modules, also known as FM1, FM2 and FM3, Each module is hosted by a partner institution. There is also a Grand Challenge following the Foundation Modules. |
| * **Induction – Introduction to NEXUSS, managing your PhD** |
| * **FM1 - Sensors and Platforms – Southampton and NOC** |
| * **FM2 -** **Autonomous Underwater Vehicles - UEA** |
| * **FM3 - ROVs and UAVs or Robotics – SAMS and HWU** |
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| **Year 2** – Second years modules focus on professional skill development. |
| * **ThinkWrite Quality Papers** |
| * **Science Communication Talking (and Listening) to Diverse Audiences** |
| * **Software Carpentry (open to first years in 18/19 following student feedback)** |
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| **Year 3 and 4** – Final years students will be prepped for the final stages of the PhD and also getting students thinking about beyond the PhD. |
| * **Writing your thesis** |
| * **Viva Survival** |
| * **Careers** |
| * **Writing grant proposals** |
| * **Relaxation techniques** |

**Grand Challenge event:** The NEXUSS Grand Challenge is the keystone element in either the first or second year of training of each cohort. Students work in teams within their cohort to address a scientific or industry-relevant environmental challenge.

* Grand Challenge cohort 1: Hosted by SAMS in Oban, Scotland as a simulated oil pipe leak. Students had access to the SAMS Teledyne Gavia, HWU Hyball ROV, SAMS drones, NOC rhodamine sensors, UoS MiniBAT undulator and HWU unmanned surface vehicle, as well as numerical modelling resources and vessel from SAMS. Lead: Phil Anderson (SAMS), Mark Inall (SAMS)
* Grand Challenge cohort 2: TBD. Ideas and sponsorship welcomed.
* Grand Challenge cohort 3: RRS Sir David Attenborough for 2-3 weeks during the Arctic sea trials. Sponsorship welcomed. Lead: Alex Brearley (BAS), Andras Sobester (UoS)

**SAOS for Environmental Science** conference: In an upcoming year, we anticipate that NEXUSS will organise a cross-cohort 2-day science conference including short oral presentations and networking-friendly poster sessions. Students from other CDTs/DTPs may also be invited. This will provide a venue for the NEXUSS community to interact, to stimulate cross-pollination of ideas, approaches and technologies, and to attract and inform future NEXUSS doctoral applicants.

# Additional NEXUSS-related opportunities

## Capital fund

As part of NERC’s £15M investment in Marine Autonomous Systems (MAS) and sensor development, a capital fund of £0.5M has been granted to NEXUSS PhD projects for the purchase of commercial off-the-shelf equipment. The fund NERC has allocated additional funds to NEXUSS to support capital purchases for NEXUSS projects. These funds are available in a semi-annual call. Current students and supervisors of current students are eligible to apply to this call for up to £25k per project (VAT inclusive), or up to a maximum of £150k (if the asset benefits, e.g., 6 students’ projects). The capital fund is intended to enhance projects, not enable projects. Proposals will be evaluated according to criteria on how the new asset will lead to innovative or high-reward science, whether it adds value to or reduces risk to the bidders’ PhD project, and whether it adds value to the NEXUSS Grand Challenge activities. Note that individuals should follow appropriate procedures in their home institution for making capital purchases.

Call is typically twice a year in September and April.

## Research Experience Placements (REPs) for undergraduates

The NERC Research Experience Placement scheme is aimed at addressing the shortage of individuals with quantitative skills coming into environmental science. REPs provide an opportunity for undergraduate students to engage in active research projects, enhancing their skills and gaining valuable experience of what it is like to be a postgraduate researcher in the environmental sciences. These placements are funded at £2500 maximum per placement, with a minimum stipend of £200 per week over a minimum of 8 weeks (maximum of 10 weeks) during the summer. Up to £500 can be used as a research training support grant, for which costs must be itemised and justified for the summer student project. Any costs exceeding the £2500 maximum must be met by the host organisation from within research budgets.

Calls for projects are typically in March, for summer student projects during the following June-September period.

<https://www.southampton.ac.uk/nexuss/programme/research-experience-placements-scheme.page>

## Internships and Placements

NEXUSS strongly encourages students to enrich their doctoral experience and employability through internships or placements as student-led research projects or casework at SAOS-leading international research, commercial or policy organisations. If you have a placement idea, please do let us know at [nexuss@soton.ac.uk](mailto:nexuss@soton.ac.uk). Placements are typically 3-6 months. For placements which do not directly contribute to the student’s PhD progress, the student would be expected to suspend for the duration of the placement. The industry partner would be expected to pay the student, at a level equal to or above a stipend replacement. Funds may be sought from NEXUSS on a case-by-case basis to support a placement.

## Industry partnerships

In addition to internships/placements as above, we are actively seeking industry partners to fund or co-fund PhD studentships, engage or involve students in workshops or field exercises, as CASE partners for PhD studentships (students typically spend 3 months at the industry partner, and the partner contributes £1000/year towards the student’s RTSG fund).