**NEXUSS CDT Research Experience Placement Supervisor Proforma 2018**

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| Lead Supervisor:  | Marc Rius |
| Email:  | M.Rius@soton.ac.uk |
| University/Research Organisation:  | University of Southampton |
| Department:  | Ocean and Earth Science |
| Project Title:  | Oceanic Biodiversity Assessments using Environmental DNA |
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| Total Student Support Costs: £ | £2500 (£200 for 10 weeks plus £500 research and training support grant) |
| *Based on a minimum of £200/week full time for a minimum of 8 weeks and maximum of 10 weeks and a £500 Research and Training Support Grant.*  |
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| Proposed Start Date: **Monday, 30th July 2018** | Proposed End Date: **Friday, 21st September 2018** |
| *Projects should run over the summer vacation and we recommend that projects will have terminated by 21 September 2018.* |
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| **Brief Summary – please provide a brief summary (maximum 300 words) of the project.***This should include:** *Project outline;*
* *Links to staff/School/Centre activity as appropriate;*
* *Supervisory arrangement;*
* *How space/equipment/supporting resource demands will be met;*
* *Elements of the project that will incorporate elements other than computer/modelling e.g. fieldwork and data collection;*
* *How the project will enhance the skills of the appointed student;*
* *Any intellectual property rights concerns that may arise from the work.*

Contemporary DNA sequencing technologies have enabled a leap in our understanding of the diversity of life in the oceans. Through the sequencing of DNA found in the environment (environmental DNA or eDNA) we are able to determine the species present in the area in which the sample was taken. This technology has vast applications in biodiversity monitoring, biosecurity, human-heath and aquaculture. This project aims to explore various methodological aspects of the use of next generation sequencing in ocean biodiversity monitoring. In particular, the student will initially explore the effects of different bioinformatic clustering algorithms on the total number of operational taxonomic units (i.e. a proxy of species richness) produced in datasets from oceanic cruises, port surveys and aquaria. The optimal algorithm will then be used to analyse current data from an active grant and PhD project. The student will be encouraged to pursue elements of the project that best suit her / his interests.Over the course of the project it is expected that the student will gain hands on experience with every element of the experimental process, including field and lab work, bioinformatics and statistical analysis. The student will gain knowledge and skills in cutting edge aquatic biomonitoring, an appreciation of independent research and general research skills useful in both academic and industrial careers.The student will be based at the National Oceanography Centre (NOCS) and will benefit from a close collaboration between staff from the Ocean Technology & Engineering Group and the Ecology and Evolution Lab. Ecology and Evolution Lab - <http://riuslab.com/>Ocean Technology & Engineering - <http://noc.ac.uk/science/research-areas/ocean-technology-engineering>National Oceanography Centre - <http://noc.ac.uk/> |
| **Please give an indicative timescale for the student’s work over the length of the project: (maximum 150 words).***This should include:** *The broad tasks the student will undertake;*
* *An indicative timescale for these tasks.*

1. Analysis of data collected on oceanic cruises and port surveys using different bioinformatic clustering algorithms (2 weeks)2. Work on coral reef tank based in NOCS (2 weeks)* Assemble list of representative species from tank and curate DNA barcode database using publically available sequences.
* Compare biodiversity detected between existing eDNA metabarcoding data and above work.

3. Work on bioinformatics methods (4 weeks)* Regenerate coral reef tank species data from raw sequence data, gaining an appreciation of methods on a familiar dataset.
* Use different algorithms to reassemble tank biodiversity data noting differences in the approaches.
* Explore novel data generated in the lab exploring variation as a result of different methods.

4. Other activities depending on student interest (2 weeks)* Possibility to attend conference on biological invasions
* Possibility to learn basic molecular biology methods for biodiversity analysis
* Possibility to learn environmental DNA sampling methods in local marinas
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| **Proposed procedure for appointing students, including selection criteria:***Please identify specific criteria that should be considered for the selection of placement students e.g. specific quantitative skills that may be required, subject knowledge etc. If a student has been pre-selected, or the research area has been led by the student, please provide the student’s contact details, and a summary of their suitability for the NEXUSS CDT REP programme.** Experience working with UNIX command line based tools
* Experience using the R programming language
* Basic knowledge of statistics & mathematics
* Interest in ocean science
* Interest in biodiversity monitoring
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