RD901

During the first six months of my PhD I undertook two courses run by the Scottish Mathematical Sciences Training Centre: one in statistics and one in mathematical modelling. I chose these classes because many of the subjects they covered would be directly relevant for my PhD project. I enrolled in the courses because I hoped to enhance my knowledge of these areas and to develop skills which would be directly useful for my own PhD project.

The statistics course focussed on generalised linear models, as well as including sections on likelihood methods and bootstrapping techniques. The mathematical modelling course covered a wide range of topics. This included population modelling, disease modelling, cancer modelling, and modelling pulse propagation in the arteries.

These courses have allowed me to meet all three learning outcomes for RD901. Firstly, I was able to enhance my knowledge of statistical and mathematical modelling techniques, and to explore a wide range of practical applications for these techniques. I have had the chance to apply some of this knowledge directly to my own PhD project. For example, as part of my PhD project I have had to develop a method to predict the percentage of mud in seabed sediment across the Firth of Clyde. This was done using a Generalised Additive Model (GAM), an extension of the generalised linear modelling techniques taught in the statistics course. The classes on population modelling, and in particularly on stage structured population models, have also proved very useful as I am currently trying to create a size-structured population model of Norway Lobster in the Firth of Clyde.

Secondly, I was able to develop my critical thinking and problem skills through the weekly exercises involved in both courses. This allowed me to test the knowledge I had learned in class and to apply it to a wide range of areas. Both courses also involved a significant amount of formal assessment, allowing me to further develop my critical thinking skills. Two assignments were submitted as part of the statistics course, and one large final assignment was submitted as part of the mathematical modelling course. A copy of these assignments can be seen in the uploaded evidence files. These assignments were formally marked, allowing me to get feedback on my work. I achieved over ▮% in both courses as can be seen in the final evidence file.

Finally, I was also able to enhance my research creativity, by broadening my knowledge and focussing on areas of mathematical biology which I had never considered before. Some of the topics covered in the mathematical modelling course were not directly relevant to my research area, particularly those which focused on modelling cancer and modelling blood flow in the heart. However, it was interesting to see the broad range of areas to which mathematical models can be applied.

In conclusion, these classes allowed me to enhance my knowledge of statistical and mathematical modelling techniques.

RD902

I have claimed 5 credits in RD902 for completing the online course PG Essentials. The first module in this course provided a useful overview of life as a PhD student at Strathclyde. This module provided useful information on the facilities available within the library. This module also provided a useful overview of the PhD process, explaining both the thesis and the viva. I completed PG Essentials within my first month as a PhD Student. The first module therefore served as a useful introduction to life as a PhD student and provided an overview of a wide range of topics. Completing PG Essentials gave me the confidence to begin my studies as a PhD student. This course therefore contributes to the first learning outcome of RD902.

Further modules within PG Essentials focused on organizing your PhD, working with your supervisor, searching the literature, writing a literature review and research data management. These courses improved my knowledge of a wide range of subjects. I found the module about carrying out a literature review to be the most useful. The module contained information on searching for relevant articles and provided options of different search engines to try. The course also contained information on how to keep track of all the articles you read. At the beginning of my PhD I had to read a wide range of journal articles in order to familiarize myself with my new subject area. I also had to synthesize this information in a literature review, which will form the basis of the first chapter of my PhD. The information contained within PG Essentials prepared me for the process. This course therefore contributes to the second learning outcome of RD902. Overall I really enjoyed this course and found it to be a worthwhile experience. The course covered a wide range of topics and served as a good introduction to PhD life at Strathclyde. As evidence for this activity I have uploaded an email showing the completed course.

I have also claimed 5 credits in RD902 for completing the online course "Engaging Beyond Academia: Industry, Networking and Opportunity". This course covered a wide variety of topics including networking, personal branding, and engaging with external organisations. I chose this course because I wanted to improve my skills in these areas. I also wanted to think more deeply about how I can make my research have a greater impact both within and outside of academia. A large part of the course focused on networking and on improving your online profile. As part of this module we had to create our own 'Linked-in' profile. I found this useful as I had not used 'Linked-in' prior to this, and think it is a great way to keep in contact with your academic network. This module also contained information on using other social media platforms, such as twitter or personal blogs, to communicate your research to a wider audience. I currently do not use any forms of social media in an academic capacity. However, this course highlighted the benefits of sharing your research online and I may therefore consider starting to do so as my research develops. This course covered a wide range of topics and provided information on career management, reputation and networking. This course therefore enhanced my professional and career development, and contributes to the third learning outcome of RD902. As evidence for this activity I have uploaded a screenshot from MyPlace showing the completed course.

RD903

Firstly, I have claimed 1 credit in RD903 for creating a data management plan. During the first two years of my PhD project I have accumulated a large amount of data. This data has come from two main sources, ████████ ████████████, and includes information on Nephrops burrow density, length-frequency distributions and Hematodinium prevalence. I have also generated a large amount of data myself, including particle tracking output which records the movement of Nephrops larvae throughout the Firth of Clyde. I chose to create a data management plan in order to record all the sources of data I have accumulated throughout the project. I also wanted to think about the best way to store this data for future use. This will become increasingly important as the project progresses and the amount of data increases. Creating a data management plan allowed me to learn about and comply with University data storage requirements. This activity enhanced my knowledge of professional conduct and therefore contributes to learning outcome 1. This activity also increased my project management skills as I had to think about the best format in which to store model output so that is could be easily understood by future students. This activity therefore also contributes to the second learning outcome of RD903. As evidence for this activity I have uploaded a copy of my Data Management Plan.

Secondly, I have also claimed 2 credits in RD903 for completing the online course Research Integrity. This course included modules on ethical approval, plagiarism, authorship, collaborative research and peer review. I chose to complete this course as I wanted to improve my knowledge in these areas. I believe that learning about these topics is important and will help me to become a professional researcher. I found the section about publication ethics and authorship particularly useful as I plan to publish some of my own work in the near future. I also found the section about plagiarism useful as it highlighted some of the commonly made mistakes. Completing this activity enhanced my knowledge of professional conduct within the research environment. This course therefore contributes to the first learning outcome of RD903. As evidence for this activity I have uploaded a screenshot from MyPlace showing the completed course.

Similarly, I have claimed 5 credits in RD903 for completing another online course called "PG Essentials: Digital Scholarship Skills". This course covered a wide range of topics including copyright, plagiarism, referencing, publishing, and bibliometrics. I enjoyed the module about comparing different online search engines, and found this to information to be helpful for conducting my own literature review. I also enjoyed the section on impact, and found it interesting to think about the advantages and disadvantages of different measures of impact. The topics covered in this course have enhanced my knowledge of a wide range of areas, and have allowed me to develop as a professional researcher. This activity therefore contributes to the first learning outcome of RD903. As evidence for this activity I have uploaded a screenshot from MyPlace showing the completed course.

Finally, I have claimed two credits in RD903 for attending the course "Research Governance and Organisation in the Mathematical Sciences". This course is run by the Department of Mathematics and Statistics. This course is split into two modules. The first module looks at ethical issues as well career progression within the mathematical sciences. The second module looks at publication, collaboration, authorship and citation. I found that the topics covered in this course were very similar to the topics covered in the Research Integrity and PGE: Digital Scholarship courses. However, this course was still useful as it focussed on examples which were applicable to the mathematical sciences. For example, the research ethics part of the course dealt mainly with the issue of manipulating data points and removing outliers. I also enjoyed the section on career progression within the mathematical sciences, as this helped me to think about what I want to do after I finish my PhD. This part of the course contained a section which looked at the advantages and disadvantage of staying in academia versus working for industry or an external organisation. I found this section to be extremely helpful and it helped me to think through possible career options. Attending the "Research Governance and Organisation in the Mathematical Sciences" course has increased my knowledge of professional conduct, particularly within the mathematical sciences. This course therefore contributes to the first learning outcome of RD903. As evidence for this activity I have uploaded an email acknowledging my participation in the course.

RD904

I have claimed 5 credits in RD904 for presenting my work at the Marine Alliance for Science and Technology Scotland (MASTS) Annual Science Meeting on the 20th October 2016. I presented a talk titled "The Transport of Nephrops norvegicus Larvae in the Firth of Clyde", in a special session focussed on Science in the Clyde. I have uploaded a copy of the conference program and a copy of my power-point presentation as supporting evidence for this activity. I chose this activity in order to gain experience of presenting my research at a scientific conference. This activity allowed me to engage with the wider scientific community and to share the results of my project, thereby contributing to the 3rd learning outcome of RD904. This activity also enhanced my communication skills as I had to think about how to present my results within the allotted time. This activity therefore also contributes to the 2nd learning outcome. The skills learned during this activity will be of great use to me, during the remainder of my PhD, and as I progress through my career, as I am likely to present at a number of other conferences.

Secondly, I have claimed 3 credits in RD904 for presenting my work to ████████████████████████ ██ As supporting evidence for this activity I have uploaded the agenda of the meeting and a copy of my power-point presentation. I chose this activity because I wanted to gain experience of presenting my research to people from a non-scientific background. This activity contributed to all three learning outcomes for RD904. This activity helped me to develop my communication skills. Although the topic of this presentation was the same as my previous presentation at the MASTS conference, I had to think carefully about how to present the same information to a completely different audience. I also had to ensure that the technical details of the project were presented in a way that would be understood. This activity also enhanced my ability to work with others. Following the meeting I was able to remain in contact with ██████ and I am currently in the process of arranging to carry out experimental work in conjunction with them. This work will involve collecting samples of Nephrops from the Firth of Clyde, and examining them under the microscope to look for infection by the parasite Hematodinium. This will allow us to determine the prevalence of the parasite across the region, and to collect data which can be used to validate my mathematical model. Overall, presenting my work at ██████ was an enjoyable experience and allowed me to establish links with the fishing community. This was the first time I had talked about my project with a non-scientific audience, and it was interesting to see how the fishermen approached my project with a completely different perspective.

Finally, I have claimed 4 credits in RD904 for assisting with tutorials in the Department of Mathematics and Statistics. During the academic year 2016/2017 I assisted with two tutorials during Semester One: MM201 (Linear Algebra and Differential Equations) and MM215 (Mathematics 2D). During Semester Two I also assisted with two tutorials: MM211 (Mathematics 3B) and MM215 (Mathematics 2D). These tutorials covered a wide range of topics including calculus, geometry, vectors, matrices, systems of linear equations, ordinary differential equations and numerical methods of integration. As supporting evidence for this activity I have uploaded a letter from the Department of Maths and Statistics, outlining the tutorials I undertook in Academic Session 2016/2017. I chose this activity in order to gain experience of teaching at a university level. This activity developed my communication skills, therefore contributing to the 2nd learning outcome of RD904. In order to deliver the tutorials I had to communicate a wide range of mathematical subjects, many of which were not directly related to my own field of research. I also had to think carefully about how to explain things in a way which would help the students to improve their understanding. This activity also enhanced my ability to work with others. In order to effectively deliver tutorials you need to communicate with the course lecturer to organise the questions for each tutorial. This activity therefore contributed to the first learning outcome. Overall, I enjoyed carrying out this activity, and will continue to be involved in delivering tutorials to undergraduate students for the remainder of my PhD.

RD905

I have claimed 3 credits in RD904 for assisting with fieldwork aboard Scotia, a Marine Scotland Research Vessel. The purpose of the survey was to get an estimate of the abundance of Nephrops in the Firth of Clyde. This was achieved by deploying a sledge, with a camera attached to it, at 40 randomly chosen locations across the region. The sledge was towed behind the boat for a period of 10 minutes. The video footage from the camera was viewed in real time by three observers on board the boat. Each observer independently counted the number of Nephrops burrows. The number of burrows was then used as a proxy for the abundance of Nephrops at each location.

I chose take part in this survey as I wanted to improve my understanding of how Nephrops abundance data is collected. I plan to use this data in my PhD in order to validate my mathematical models. I therefore felt it was important to see how the data was collected and to observe possible sources of error which could occur during the data collection process. This activity enhanced my knowledge of my subject area, and therefore contributes to the first learning outcome of RD905. A large amount of organisation was required to take part in this activity. Prior to going on the boat I had to complete a Sea Survival Course, pass an ENG1 Medical Test, and organise insurance. I also had to liaise with Marine Scotland to organise suitable points where I could join and leave the vessel. This activity therefore also contributes to the 2nd learning outcome.

Similarly, I have claimed 5 credits for assisting with fieldwork on Alba, another Marine Scotland Survey Vessel. The purpose of the trip was to collect sediment samples from a number of different stations across the Firth of Clyde. The sediment samples were then analysed to determine their nutrient composition and porosity. As part of my PhD, I have modelled the composition of seabed sediment across the Firth of Clyde. This research trip enhanced my knowledge of this area and therefore contributes to the first learning outcome of RD905.

Furthermore, I have claimed 1 credit in RD905 for attending the Postgraduate Induction Day. The induction day covered a number of topics including managing your research, the PGR Certificate and a general overview of life as a PhD student at Strathclyde. The courses offered during the Induction Day gave me the skills and knowledge required to take ownership of my PhD. This activity therefore contributed to the 2nd learning outcome of RD905. The Induction Day took place during my first week at Strathclyde and therefore provided me with a good opportunity to meet other students and to settle into life at Strathclyde. As evidence for this activity, I have uploaded a screenshot from MyBookings highlighting my attendance at this activity.

Finally, I have claimed 1 credit in RD905 for assisting at the Marine Alliance for Science and Technology Scotland (MASTS) Annual Science Meeting. The conference was held in the Technology and Innovation Centre at Strathclyde University from the 19/10/16 – 21/10/16. Prior to the conference I helped to lay out the exhibition area, set up poster-boards, and sort out name badges. During the conference, I helped with registration and also helped to distribute the microphones during the Q&A sessions. Carrying out this activity improved my team-working and organisational skills, and therefore contributes to the 2nd learning outcome of RD905. As evidence for this activity, I have uploaded a copy of the helper's rota from the conference.