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	For completion by External Examiner:		
Name of External Examiner:	Professor Mark Paul Stevens		
Home Institution / Employer of External Examiner:	The Roslin Institute & Royal (Dick) School of Veterinary Studies, University of Edinburgh		
Programme and / or Modules Covered by this Report	MRes in Biosciences & MRes Stem Cell Neurobiology Stages I and II		
Academic Year / Period Covered by this Report:	2018/19	Date of Report:	23 September 2019

Please complete all information in the spaces provided and submit within **six weeks** of the Examining Board (the dissertation stage Examining Board in the case of postgraduate Master's programmes).

Please note this form will be published online and should not make any reference to any individual students or members of staff in accordance with the General Data Protection Regulation (2018).

Please extend spaces where necessary.

1. Programme Structure (curriculum design, programme structure and level, methods of teaching and learning)

Stage I

Stage I of the MRes in Biosciences (and nascent MRes in Stem Cell Neurobiology, which shares two modules) instils valuable knowledge and skills that prepare the candidates well for Stage II and future careers in postgraduate research. Stage I comprises three modules: BIT002 Research Techniques in Biosciences (or BIT018 with research techniques tailored to Stem Cell Neurobiology candidates), BIT010 Data Handling in Statistics & Bioinformatics, and BIT011 Key Skills in Research Practice. Within these, diverse teaching and assessment methods are used, with many examples of innovation and good practice.

A comprehensive handbook is provided and learning objectives are clear and logical. In my view, the balance of lectures and independent learning is appropriate for Masters level study. The introduction of the MRes in Stem Cell Neurobiology offers an opportunity to evaluate the benefits of lectures, essays and other activities tailored to the area of study in Stage II, as opposed to the exposure to a broader range of disciplines in the MRes in Biosciences (e.g. ecology, neurobiology, cell biology and molecular biology). The MRes in Stem Cell Neurobiology also offers more practical classes, with a corresponding increase in the number of contact hours. With time, the relative merits of offering a wider range of MRes programmes with specific training in research methods should be considered, including the areas where significant

research strength (and thus potential for Stage II projects) exists (e.g. Ecology & Conservation, Microbes & Infection).

BIT002 Research Techniques in Biosciences. The portfolio of coursework for assessment included a write-up of gene cloning experiments, a News & Views article on CRISPR/Cas9 editing and essays spanning analysis of protein function, ecology, stem cells and neuroscience. In my view, the essay questions are most useful when candidates are asked to devise a strategy to apply taught techniques to a problem, rather than simply review an area of science. As noted in my report at this stage in the two preceding years, the essay to describe the impact of climate change on an ecosystem would be much stronger if it focused on how such impact could be studied and quantified. The diversity of topics covered by BIT002 is challenging for candidates that specialised in a narrow discipline at undergraduate level, but also gives a wider perspective of bioscience research. It is acknowledged that the topics will reflect the expertise of the academics available to set and mark assessments, but the team may wish to discuss whether the module covers the key areas and skills biosciences postgraduates need. A risk, expressed by some candidates at a meeting in January 2019, is that no subject is covered at a depth that provides a meaningful perspective of the field or research techniques. Some students considered activities beyond their area of study in Stage II to be a distraction, but others have previously cited the diversity as one of the factors that attracted them to the degree. As exercises in scientific writing, merit exists in asking candidates to review literature, synthesise ideas and distil key messages in unfamiliar areas. Revision sessions and guidance on further reading are welcome initiatives to support students that may lack foundation knowledge from their first degree. More interactive or hands-on training sessions would be welcome, though it is accepted that this poses logistical challenges.

Concern was expressed by the students regarding the intensity of assessment in BIT002, and the portfolio deadline was extended from 14 December 2018 to 3 January 2019 to account for this. While effective time management is a reasonable expectation at Masters level, consideration could be given to a series of sequential deadlines to ease the pressure on students, assuming that this is compatible with the demands on the course secretary and markers. This may also afford more opportunity for candidates to receive feedback on standards and performance at an earlier stage to allow for iterative learning. The phasing of some taught components relative to assignments could be further optimised and there may be merit in starting aspects of the BIT002 module sooner to ease pressure.

BIT010 Data Handling in Statistics & Bioinformatics. This module embeds key skills in statistical analysis and bioinformatics that will be of lasting benefit to those pursuing research careers. It is welcome that candidates must pass both the module and mini-projects in statistics and bioinformatics in order to progress to Stage II. The students were complimentary about how the statistics module was taught this year, in particular citing the value of online materials, case studies and foundation lectures for those less familiar with R and statistics. Support available from demonstrators was indicated to be good. Some candidates expressed a desire for datasets of the kind they are likely to experience in Stage II (in particular by MRes in Stem Cell Neurobiology candidates asked to analyse a dataset related to otter ecology), but in my view all candidates must sit the same examination and no dataset will please all. The bioinformatics module was generally well received and the new requirement for candidates to submit their mini-projects in the format of a journal manuscript provides a welcome exercise in scientific writing, in addition to other learning objectives of the module. Some candidates felt that a high level of background knowledge of bioinformatics and computer skills was assumed of them, and provision of more online material, revision

sessions and more demonstrators may be helpful. The changes made by the team since the 2017/18 session appear to have been positive.

BIT011 Key Skills in Research Practice. This module continues to be a beacon of good practice among postgraduate degree programmes I have examined. It involves preparation of a grant proposal related to the project to be undertaken in Stage II (60% of marks), as well as preparation of abstracts, a lay article for public engagement, an ethics assignment, poster and oral presentation. A recently added exercise in critical evaluation of a manuscript appears to be performing well and aids separation of high and low performers. The grant proposal is an excellent initiative as it requires review of pertinent literature, formulation of ideas, hypotheses and objectives, selection of experimental approaches, and planning (including time management, contingency plans, and where appropriate assessment of risks and ethics). It will be hugely valuable to those pursuing research careers and marshals useful information for the Stage II dissertation (BIT014). As in previous years, the level of input from supervisors was somewhat inconsistent at this stage and the extent to which candidates had been proactive in identifying supervisors and refining project plans varied. In relation to project plans, there appears to be robust independent assessment of the feasibility of projects and checks to ensure that they will involve a substantial body of original, innovative and intellectually challenging work consistent with expectations at Masters level. One project title was found to be shared by two candidates and the projects pertain to modulation of Rho family GTPases by Type III secreted effector proteins of attaching & effacing *E. coli*. After careful scrutiny of proposals, the projects were found to be adequately distinct. Mindful of a significant issue with data sharing among candidates engaged in similar projects in the 2017/18 session, it would be timely to remind the candidates and supervisors of expectations on originality and independent working.

BIT018. Stem Cell Neurobiology. ~~Dr Chen~~ is to be commended for the significant effort expended in devising new course materials tailored to candidates engaged in stem cell research in Stage II. The module replaces BIT002 for these candidates and involves an impressive number of essays and practical classes covering neuronal development, degeneration, electrophysiology, epigenetics and stem cell culture and characterisation. A consequence of the increased number of BIT018 contact hours was that the candidates were placed under considerable pressure during completion of the BIT010 mini-projects on statistics and bioinformatics, requiring adjustment of marks at the Interim Examination Board as discussed in Section 3. Attention to the timetabling of activities, and whether all BIT018 activities are necessary to achieve learning outcomes, will be needed to avoid repetition of the issue in future years.

The candidates evidently find Stage I intense and challenging. Some considered that the workload was excessive and compromised the quality of the work they could produce, but for the most part candidates appear to manage the pressures. Rates of withdrawal from the programme or requests for consideration of mitigating circumstances during Stage I were relatively low. In most cases, induction was agreed to have gone well and the candidates spoke positively about the support they receive from the organisers and secretary, in particular ~~Dr Jones~~ and ~~Ms Breeze~~. Without exception, all candidates were enthusiastic about entering the research phase.

Stage II

Stage II offers the candidates the opportunity to undertake original and independent postgraduate research, typically comprising a laboratory-based project of approximately 6 months duration (module BIT014). It is expected that candidates

produce a comprehensive dissertation and the module handbook provides clear instructions. Candidates are given a lecture and written guidance to explain Unfair Practice and its consequences. Progress against stated objectives is evaluated at a mid-term review (typically in June) to identify any barriers to progress and changes to objectives. Candidates are required to produce a poster on their research, a short article for a public audience, and to give an oral presentation (c. 10 minutes and 5 minutes for questions) attended by all other candidates, selected academic staff and the external examiners. Marks for the poster, lay article and oral presentation form part of the Stage II assessment (BIT013) and the module instils valuable presentation skills.

2. Academic Standards (comparability with other UK HEIs, achievement of students, any PSRB requirements)

Stage I

I reviewed the research portfolios for the four Stage I modules above and was provided with all the materials required to assess standards. Overall standards for Stage I were comparable to the previous years I have examined. Performance in BIT002 was strong, with most candidates achieving merit or distinction-level marks (>61%) and just one at 50%. Analysis of a sample of assessments at the pass-fail, merit and distinction boundaries indicated that the allocation of marks was justified and consistent with expectations at level 7. The pass rate for BIT010 and the statistics and bioinformatics mini-projects was also very good this year, with adequate arrangements in place for resubmission of mini-projects and the capping of marks for those that failed the module overall. Performance of BIT011 was generally excellent, with high rates of completion of the numerous assignments set, with all but one candidate achieving a pass and most module marks at merit-distinction level. Standards in BIT018 are harder to gauge given the lack of previous cohorts and the relatively small number of candidates (four), but generally the assignments performed well and levels of attainment are reasonable. Overall, all but one candidate met the criteria to progress to Stage II, accepting that some may be required to resubmit mandatory components of BIT010. Around two-thirds of the cohort will be in a position to achieve distinction grades following the dissertation, having achieved >65% for Stage I respectively. Some candidates found it frustrating that they could only access a distinction by achieving at least 65% in Stage I, but the criterion is set at University level and rewards those that performed consistently highly in all areas of the programme. One candidate elected to withdraw owing to acceptance of a Ph.D studentship, but passed Stage I and will receive a postgraduate certificate. Overall, academic standards are comparable with another Masters degree programme I have examined, and at my own institution.

Stage II

I evaluated a sample of 12 dissertations across a broad range of topics (see Section 4). Academic standards for the MRes dissertation (BIT014) and associated poster and oral presentations (BIT013) were appropriate relative to expectations at Master's level and academic standards in my organisation, and others I have examined. In order to achieve a Merit grade, candidates are required to have obtained at least 55% in Stage I, 60% for the dissertation and 60% overall. To achieve a Distinction grade, candidates are required to have obtained at least 65% in Stage I, 70% for the dissertation and 70% overall. This rewards consistent strong performance and is appropriate to ensure that students apply themselves fully to the taught components. The number of candidates obtaining Pass, Merit and Distinction grades this academic year is similar

to previous years, with a mean mark of c. 70% being near identical to the 2017/18 academic session and justified based on my scrutiny of Stage II materials. The assessment procedures, grade descriptors and marking have been generally consistent during this time (see Section 3).

3. The Assessment Process (enabling achievement of aims and learning outcomes; stretch of assessment; comparability of standards between modules of the same level)

Stage I

Clear criteria for allocation of marks were provided, with a detailed rubric in most cases, and there was welcome evidence of moderation (and third marking where required) for key exercises such as the mini-projects and the grant proposal. All elements of BIT018 were double-marked, and while this represents good practice and identified some disparities between assessors, it is acknowledged to be time- and labour-intensive. Agreement in scores between markers was generally good, with the exception of two grant proposals (below). The difference in quality of work in Pass, Merit and Distinction categories was generally clear, and almost always supported by detailed annotation and constructive feedback on the paper portfolio or electronic assignments in TurnItIn. Occasionally similarity between submitted materials and online content was identified at >50%. In some instances this was explained by use of a large number of online sources but at a low percentage of content sharing, or owing to inclusion of a standard University pro forma for risk assessment. Similarity could also be explained by overlap in the references cited. In one instance where shared tracts of text existed in the main body of an essay, robust processes were activated to consider the possibility of Unfair Practice. For two grant proposals, a third marker was assigned that gave marks >10% different from either the supervisor or second marker. In this case, being unable to select the two marks that were closest, it was agreed by the Interim Examination Board to take the mean of the three marks, acknowledging the value of having three independent assessments of the work. A clear rubric is available to support markers of the grant proposals. It was noted that the pressure of laboratory work and teaching on BIT018 had put the MRes in Stem Cell Neurobiology students under considerable pressure during the phase of writing the BIT010 statistics and bioinformatics mini-projects. It was agreed that this amounted to 1 week lost of the 11 weeks allocated to BIT010 (9%) and therefore to apply 'scaling' to the marks attained for the BIT010 assignments by the affected candidates, amounting to 9% of the mark achieved for each component. This was agreed to be reasonable at the Interim Examination Board meeting, and to be preferable to an arbitrary uplift.

I found Stage I to be administered very professionally and mitigating circumstances and extensions were given full consideration at the Interim Examination Board in January 2019 before marks were agreed. The Secretary for the programme is to be commended for her hard work in managing administration of Stage I of the programme and the demands of students. Marks were accurately transcribed from assignments into spreadsheets in all the instances I examined. Robust procedures are in place for identifying and investigating Unfair Practice. The Interim Examination Board meeting was conducted professionally and in accordance with established procedures.

Stage II

A clear rubric is provided to supervisors and additional markers to evaluate dissertations for evidence of knowledge & understanding; analysis & evaluation of data; synthesis & critical analysis; presentation (including figures, tables, referencing); and the level of achievement. Additionally, supervisors are able to provide a mark

(which contributes 25% of the total mark for the module) reflecting on personal management & diligence; initiative, independence & originality; and technical ability (both practical & analytical). As noted in my 2017/18 report, the contribution of the supervisors mark for effort to the overall module mark (and thus Stage II and the MRes overall) is excessive. Indeed in many organisations an MRes dissertation is assigned to internal and external examiners who agree the degree classification with no input from the supervisor. It is pleasing to note that in response to earlier suggestions, the maximum contribution of the supervisors mark to the BIT014 mark will be reduced to 15% for the 2019/20 academic session onwards. I support the notion of supervisors providing a mark for effort, but stress that this must be fully justified in writing. One instance this year of a supervisor mark of 85% (equating to 21.25% of the BIT014 mark) with no commentary to justify it was unacceptable. It would be timely to remind supervisors of their obligations and to consider excluding potential supervisors if they consistently neglect to adhere to expectations.

4. Examination of Master's Dissertations (if applicable) (sample of dissertations received, appropriateness of marking schemes, standard of internal marking, classification of awards)

I was sent all dissertations and agreed with the other external examiner to assess twelve of these. The dissertations were selected partly as they aligned with my research expertise, but I also took a sample of diverse topics outside my field. In general these were founded on preliminary data and articulated sound hypotheses and clear logical objectives. There was generally good application of analytical tools to datasets, supported by Stage I training. I was provided with all the information required to evaluate the dissertations, the assessment process, and academic standards. I drafted marks relative to the rubric and blind to the assessments of the supervisor and additional marker(s). My marks were generally within 10% of others, with two significant exceptions. I identified these disparities at the main Examination Board and it was accepted that few instruments were available to the Board to moderate marks at the stage that final marks were agreed as robust processes for double marking and a detailed rubric had been in place. It was agreed that the organisers would remind supervisors of the standards expected when assigning marks, and it may be appropriate for new supervisors to receive additional guidance, for example by marking a selection of dissertations alongside more experienced assessors. Ideally assessors should be fully independent of each other (i.e. not one line managed by another). In one case for the 2018/19 BIT014 module, a third marker was assigned owing to variance between the supervisor and second marker of >10% (with selection of the two lower marks). This is a welcome initiative and ensures robust moderation of a module that contributes substantially to the overall Stage II and MRes mark.

Following an issue relating to four students in the 2017/18 session, candidates and supervisors were reminded of the expectation that Master's level research reflects independent and original research, and that where findings involve input from others this is fully and transparently acknowledged to allow the specific contributions of the candidate to be evaluated. This appears to have been effective, as no similar concerns were identified this year. I am content that robust processes are in place to record and consider extenuating circumstances. Extensions were agreed where appropriate, and where candidates requested that the Examination Board consider extenuating circumstances, these were discussed confidentially and fairly.

5. Year-on-Year Comments

[Previous External Examiner Reports are available from the Cardiff University Website [here](#).]

Stage I

Performance in modules BIT002, -010 and -011 in this academic year was broadly comparable to that in the 2017/18 session at Stage I. Compared to previous years, fewer candidates will be required to re-submit the BIT010 mini-projects in order to progress. In one instance a candidate did not achieve marks required to progress to Stage II having failed two modules, however I was reassured that all relevant procedures were followed and that a process for consideration of appeals is in place. I am grateful to the course organisers for addressing remarks I made in the 2017/18 session and am fully satisfied with the institutional response to my last Annual Report. In particular, the resolution to the significant issue I raised at Stage II in 2017/18 of data sharing in the BIT014 dissertations of four candidates was resolved satisfactorily. This had involved consultations with the affected candidates, revision of the theses and assignment of two fully independent markers, each of which evaluated two of the proposals enabling potential overlap to be identified. I am satisfied that this process was robust, fully compliant with University regulations and did not disadvantage the candidates, three of whom were able to access merit grades despite resubmission.

Stage II

The proportions of dissertations awarded Pass, Merit or Distinction grades was comparable to previous years, and the marks were generally well supported by feedback to candidates. The conduct of the Examination Board was professional and responsive. It is pleasing to see that actions suggested in previous years have been implemented.

The course secretary produces minutes to a very high standard and does an exemplary job of collating course materials, marks and spreadsheets. She often works under time pressure and is to be commended for enabling the smooth running of the programme.

6. Preparation for the role of External Examiner

Administration related to my visits in January and September 2019 was highly efficient and appreciated. I was provided with all the information required to assess the degree and academic standards, including all annotated coursework, mark sheets and collated marks.

7. Noteworthy Practice and Enhancement (good and innovative practice in learning, teaching and assessment; opportunities for enhancement of learning opportunities)

Stage I

Many examples of good practice exist and the course and module organisers are to be commended for the significant effort expended in Stage I. On sampling a subset of the BIT011 portfolios it was obvious that coursework was richly annotated by ~~Dr Jones~~, with clear allocation and justification of marks and constructive feedback. It was evident that the students greatly value this level of engagement, and they spoke positively about the effort expended by the module organisers and their ability to resolve problems. For candidates due to undertake field work in Stage II robust plans were in place for scheduled updates and remote support. It was helpful to receive minutes of the Internal Exam Board meeting that preceded my visit in January 2019, which noted issues raised by module coordinators and suggested appropriate actions.

It was evident from this and the conduct of module organisers throughout that they care about the quality of teaching, standards, student well-being, and the students experience of the degree. While the students were generally positive at the group discussion and interviews held on 16 January 2019, they asked for improved communication, especially around timetabling and deadlines, and consideration of whether all assessed components of Stage I are necessary and appropriately weighted, given the intensity of the stage.

Stage II

I met with the majority of the students following their oral presentations on 17 September 2019. Generally their experience of Stage II, and of the programme as a whole, had been very positive. I was frequently impressed by the volume and quality of data accrued by candidates in their Stage II projects. I do not feel their experience of research was diminished by spending c. 6 months on their projects, relative to c. 10 months for research-only programmes at other organisations. Suggestions for enhancement have been made above.

8. Appointment Overview (for retiring External Examiners only) (significant changes in standards, programme/discipline developments, implementation of recommendations, further areas of work)

It has been my pleasure and privilege to act as External Examiner of these MRes programmes. In very many ways they are a beacon of good practice and the organisers, supervisors and administrative staff are to be commended for their consistent performance over my tenure. I have found the team to be responsive to criticism and many of the suggestions that I and fellow examiners raised to enhance the programme were rapidly implemented. Examples have included lowering the proportion of the total mark for BIT014 that can be assigned by the supervisor from 25% to 15%; precluding two or more projects with similar research objectives in a given laboratory; assignment of third markers for significant coursework where variance in marks of greater than 10% exists; introduction of additional guidance on the expectations of supervisors and feedback expected from assessors; and a new assignment related to critical review of literature. Standards have remained consistently high year-on-year, and where significant issues were identified (for example requiring resubmission and independent assessment of a subset of dissertations in the 2017/18 session), the team acted professionally and in full compliance with University regulations. The students evidently find the programme challenging, but in my view they receive an excellent foundation for careers in bioscience.

While early days, I urge the team to evaluate student feedback on the MRes in Stem Cell Neuroscience (accepting the small cohort this year ($n=4$) and envisaged for 2019/20 ($n=7$)), in particular whether tailoring of the practical classes, research techniques and assessments to the field of study has delivered a more focused and positive experience for the students compared to exposure to a wider range of disciplines during Stage I of the MRes in Biosciences. Any appetite at University level to expand the number and diversity of MRes programmes will need to be tempered by consideration of the considerable effort required from organisers and academic staff to launch, deliver and assess such programmes, as many are already incredibly stretched by other teaching and research commitments. In 2019/20 the intake on the statistics module is set to increase by 18 to c. 50 students owing to sharing with the MRes in Global Ecology & Conservation and consideration is being given to delivering training in key research skills (BIT011) to other programmes. The effort required to

assess coursework and provide rich constructive feedback is very considerable. It is evident from my discussions with MRes in Bioscience candidates that they hugely value the feedback they receive and it will be important for the University to balance a desire to increase student numbers against the quality of the student experience. Administrative staff have provided excellent support to the organisers, students and Examination Board throughout my tenure as External Examiner and are to be commended for the key role that they play.

9. Annual Report Checklist

Please include appropriate comments within Sections 1-7 above for any answer of 'No'.

		Yes (Y)	No (N)	N/A (N/A)
Programme/Course information				
9.1	Did you receive sufficient information about the Programme and its contents, learning outcomes and assessments?	Y		
9.2	Were you asked to comment on any changes to the assessment of the Programme?		N	
Commenting on draft examination question papers				
9.3	Were you asked to approve all examination papers contributing to the final award?		N	
9.4	Were the nature, spread and level of the questions appropriate?			N/A
9.5	Were suitable arrangements made to consider your comments?			N/A
Examination scripts				
9.6	Did you receive a sufficient number of scripts to be able to assess whether the internal marking and classifications were appropriate and consistent?			N/A
9.7	Was the general standard and consistency of marking appropriate?			N/A
9.8	Were the scripts marked in such a way as to enable you to see the reasons for the award of given marks?			N/A
9.9	Were you satisfied with the standard and consistency of marking applied by the internal examiners?			N/A
9.10	In your judgement, did you have the opportunity to examine a sufficient cross-section of candidates' work contributing to the final assessment?			N/A
Coursework and practical assessments				
9.11	Was the choice of subjects for coursework and / or practical assessments appropriate?	Y		
9.12	Were you afforded access to an appropriate sample of coursework and / or practical assessments?	Y		
9.13	Was the method and general standard of assessment appropriate?	Y		
9.14	Is sufficient feedback provided to students on their assessed work?	Y		
Clinical examinations (if applicable)				
9.15	Were satisfactory arrangements made for the conduct of clinical assessments?			N/A
Sampling of work				
9.16	Were you afforded sufficient time to consider samples of assessed work?	Y		
Examining board meeting				
9.17	Were you able to attend the Examining Board meeting?	Y		

9.18	Was the Examining Board conducted properly, in accordance with established procedures and to your satisfaction?	Y		
9.19	Cardiff University recognises the productive contribution of External Examiners to the assessment process and, in particular, to the work of the Examining Board. Have you had adequate opportunities to discuss the Programme and any outstanding concerns with the Examining Board or its officers?	Y		
Joint examining board meeting (if applicable)				
9.20	Did you attend a Composite Examining Board, i.e. one convened to consider the award of Joint Honours degrees?			N/A
9.21	If so, were you made aware of the procedures and conventions for the award of Joint Honours degrees?			N/A
9.22	Was the Composite Examining Board conducted according to its rules?			N/A

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