## Course details

<table>
<thead>
<tr>
<th>Course name*</th>
<th>Biologics and Protein Design</th>
</tr>
</thead>
<tbody>
<tr>
<td>SCQF credit points*</td>
<td>☒ 10 ☐ 20 ☐ 40 ☐ Other</td>
</tr>
<tr>
<td>SCQF credit level*</td>
<td>11</td>
</tr>
<tr>
<td>UG or PGT*</td>
<td>PGT</td>
</tr>
<tr>
<td>Normal year taken*</td>
<td>Postgraduate</td>
</tr>
<tr>
<td>Visiting student availability*</td>
<td>☒ Not available to visiting students</td>
</tr>
<tr>
<td></td>
<td>☐ Available to all students</td>
</tr>
<tr>
<td></td>
<td>For visiting students attending for the full year.</td>
</tr>
<tr>
<td></td>
<td>☐ Available to part-year visiting students only</td>
</tr>
<tr>
<td></td>
<td>For a one-semester VS variant which has a different credit value or course content to its ‘parent’ course.</td>
</tr>
<tr>
<td>Home subject area</td>
<td>Postgraduate</td>
</tr>
<tr>
<td>Course organiser*</td>
<td>Malcolm Walkinshaw</td>
</tr>
<tr>
<td>Course administrator*</td>
<td>Vicky McTaggart</td>
</tr>
<tr>
<td>Contact teaching hours*</td>
<td>approx 20</td>
</tr>
<tr>
<td>Pre-requisites*</td>
<td>To have completed certificate level courses in the owning programme.</td>
</tr>
<tr>
<td>Co-requisites*</td>
<td>None</td>
</tr>
<tr>
<td>Visiting student pre-requisites*</td>
<td>N/A</td>
</tr>
<tr>
<td>Prohibited combinations*</td>
<td>None</td>
</tr>
<tr>
<td>Semester*</td>
<td>☒ 1 ☐ 2 ☐ Full year</td>
</tr>
<tr>
<td>Timetable (day and time)*</td>
<td>TBC</td>
</tr>
<tr>
<td>Campus location*</td>
<td>Distance Learning</td>
</tr>
</tbody>
</table>

## Rationale/short description

1. **Why is this proposal being made?**

   We wish to broaden the appeal of our distance learning M.Sc programme, Next Generation Drug Discovery. Recruitment has been disappointing perhaps because the subject proposed is too “niche”. The new course will broaden the appeal not only to small ligands but to biological drugs. In concert with a parallel research project in "Research Project in Drug Discovery and Protein Biotechnology", these courses will form a Distance Learning Programme in “Drug Discovery and Protein Biotechnology”.

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*Paper Hi*
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2. What evidence is there of student demand?
The field of biologics, namely medicinal compounds created by biological processes, is a growth area in modern pharmacology. Many people in the industry have developed as organic/medicinal chemists. The new course will allow these people to educate themselves to keep their skills relevant in the next generation of drug discovery.

3. Is this an additional course, or is it a replacement course?
Additional.

4. What are the steps needed to secure external validation, if appropriate?
None.

5. Please provide a short description of the course.
There is a massive growth in the use of proteins as therapeutic drugs. This course will cover the design and potential uses of different families of proteins.

Course aims and objectives

1. What balance of knowledge, understanding, skills and attitudes or values does the course aim to achieve? Please list aims and objectives below.
   - Appreciate the Architecture and Design of Biologics, including
     - Antibody structure
     - Design of “minibodies” and single chain Fabs
     - Engineering antibody-like domains
     - Hormone proteins (eg insulin, ILGF, interleukins, interferon)
     - Protein-protein interactions;

   Understand and critically appreciate issues of stability, bioavailability and the role of post translational modifications; and demonstrate knowledge of production and biochemical/biophysical characterisation of biologics.
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### 2. Have the course objectives been clearly set out?
Yes. They are to give students the requisite knowledge, skills and understanding to understand critically the literature about medicinal biologics and to underpin a subsequent research project in the topic.

### 3. Do the course aims and objectives complement those of existing courses?
Yes. The course applies principles used for small molecule ligand discovery that is covered in the Next Generation Drug Discovery programme and broadens that programme as well.

### 4. If there is overlap with other courses, can duplication of effort be justified?
Some lectures in protein mimetics are proposed for Hons Biotechnology for next year but these are not broad enough, appropriate for a distance format, or in sufficient depth for postgraduate study.

### 5. How does the proposal relate to any relevant subject area benchmarks?
N/A

### Intended learning outcomes

1. What are the intended learning outcomes of the course?
   - A knowledge of different kind of biologics used therapeutically;
   - an appreciation of the demands for purity, characterisation and quality control, and how to achieve them; and
   - a critical understanding of the principles and limitations of rational design of biologics.

2. What transferable skills will students acquire?
   - Computing skills; thinking in three-dimensions
   - Problem solving
   - Group work
   - Self-reflection

### Student intake

1. At what students is the course aimed?
Distance learning students in the M.Sc in Drug Discovery & Protein Biotechnology.
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2. What are the formal qualifications for admission?
Acceptance onto the M.Sc programme

3. Are there additional attainments needed to undertake the course?
no

4. What is the minimum number of students the course must attract if it is to be viable?
5

5. What is the maximum number of students which can realistically be accommodated?
100

Organisation of teaching

1. What teaching methods will be used?
The course will be delivered through aligning it to a problem solving exercise that is assessed. There will be self-paced on-line lessons provided for students to learn about content and to self-assess their understanding. There will be virtual class rooms in real-time using Collaborate for tutorial work, and for drop-in sessions for students needing individual help.

2. Beyond participation in timetabled teaching, what independent study activities (and associated time commitments) will be expected of students?
Students will need to work through on-line material between virtual class-room events. They will be expected to keep an electronic portfolio of their engagement and reflections on their progress.

3. Comment on the appropriateness of teaching-learning strategies proposed in the light of: programme/course objectives; intended learning outcomes; programme/course content and structure; the students taking the programme/course; staffing arrangements (including frequency and size of tutorial groups, ratio of demonstrators to students).
The teaching strategy has been designed to promote and maintain student engagement during distance learning. There is an emphasis on interaction and communication, through both virtual classrooms and discussion groups. The problem that is assessed is chosen to be authentic and related to working practice in an industrial/research environment.
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4. What aspects of the teaching-learning proposed are innovative or enhance existing good practice?
   The use of video interviews (alternative transcripts will be provided) of people in Edinburgh actually doing work related to the subject and the problem posed.
   The use of electronic portfolios to capture the skills that students acquire and to encourage reflection on their progress.
   Submission of a sub-problem mid-course in order to get formative feedback that will feed forward to the assessed work.

5. Have checks been made for potential clashes with other relevant courses?
   ☒ Yes
   □ No

Content of the course

1. Please outline the indicative teaching programme. Include week/lecture numbers, lecture titles, description and suggested reading.

<table>
<thead>
<tr>
<th>Slot</th>
<th>content</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Introduction. To the problem. Priming students on main problem to be assessed and guidance to the on-line modules that will prepare them for it.</td>
</tr>
<tr>
<td>2</td>
<td>Virtual Classroom. Introduction to sub-problem.</td>
</tr>
<tr>
<td>3&amp;4</td>
<td>Submission of sub-problem, Virtual Classroom. Feed forward to the main problem.</td>
</tr>
<tr>
<td>5</td>
<td>Virtual Classroom. Submission of main problem.</td>
</tr>
</tbody>
</table>

2. Can the topics be handled on the basis of presumed previous knowledge and experience of the students?
   This course will run in the second year of the M.Sc programme. As such, the 1st year courses that were designed to have everyone to have the same basic knowledge will have been taken.

3. Is the content within the expertise of the staff available?
   Yes
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#### Student assessment and guidance

1. **Please expand as appropriate on the components of assessment to be used on the course.**

   An electronic portfolio will be kept by students including a blog on their engagement, and a linkage to a list of graduate attributes for which they will provide appropriate evidence from the course. (50%)

   There will be a problem based exercise based on a vignette of our own research in which the students will go through the computational aspects required to achieve it and to assess their work critically. (50%)

2. **Outline components of assessment for part-year visiting students, where these are different from those above.**

   N/A

3. **How will coursework, examinations (including class exams) and any other assessed work be timetabled?**

   The assessed hand-in will be at the end of the course. Note that the course will be timetabled such that students are not doing another at the same time.

4. **What exemptions, if any, are offered and on what basis?**

   None

5. **What provision is made, where appropriate, for resit examinations or for resubmission of coursework?**

   N/A

6. **How will the course be externally examined?**

   An external examiner will be appointed as for the M.Sc in Next Generation Drug Discovery. There will be an exam board drawn from members of the course team, who will sign off assessment as being at the appropriate level.

7. **How will students be kept regularly informed on their progress?**

   By self-assessment through on-line learning materials; through Virtual Classroom; through feedback on the sub-problem; and by engagement with their peers through discussion boards.

8. **What help with difficulties will students be given?**

   There is a dedicated Programme manager who will triage problems to solve “nuts&bolts” problems themselves or to direct them to academic staff.
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### Feedback and evaluation

1. **How will the effectiveness of the course in meeting its objectives be determined?**
   
   We will assess the effectiveness through Programme Review meetings, and interaction with the External examiner.

2. **What feedback will be sought from students and others e.g. those involved in teaching?**
   
   We will build in a questionnaire into the course to elicit student opinion. We will form a staff-student committee across the owning programme to collect more discursive views. Programme review meetings, the exam-board, and discussion of the external examiner’s report will be points for reflection by the staff.

3. **What course monitoring procedures will be followed?**
   
   Normal QA procedures will be followed.

### Resource requirements

1. **Will the course require significant new resources or additional funding?**
   
   No

2. **How will the course be staffed (including the provision for tutors and demonstrators)?**
   
   Core M.Sc Drug Discovery Staff.

3. **What lecture theatres and other teaching space will be needed and what laboratory, computing or other facilities will be required?**
   
   N/A for a distance learning course.

4. **Are there any other significant resource requirements?**
   
   No

5. **Are there any additional costs to be met by the students?**
   
   No
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Documentation

1. What course documentation will be available to students and to external examiners?
The course description will be available on the MSc website. A course booklet will be prepared. The information will be available through the VLE.

2. What steps need to be taken to publicise the course?
The course will be advertised within biology MSc courses through the existing Masters publicity mechanisms. In addition we will advertise on Google Ads and on specific interest websites relevant to our target audience.

Teachability

1. Discuss the course’s teachability. See guidance notes.
In common with all distance learning courses we recognise that we are likely to have a higher proportion of students with special needs than there are on campus courses. Accordingly, where feasible, we will provide the same material in a variety of formats (e.g. transcripts of videos; recordings of virtual classrooms) and we will follow best practice in digital learning design. (e.g. provide alt keys for images), as well as choosing software designed for teachability(e.g. Xerte).