Medicinal Chemistry Research Coursework

Faculty: Natural Sciences

Department: Chemistry

Module name: Medicinal Chemistry 2

Degree: BSc Chemistry, MSci Chemistry with Medicinal Chemistry

Level: Y2

Approximate number of students: 60-80

Duration: Set over 4 weeks, expecting 10-15 hours of work from students

Weighting and credit: 20% of module, module is 8.3% of Y2, Y2 is 20/35% of BSc/ MSci degree respectively

Module ECTS: 5

Module Type: Elective

Insights colour key

Educational Developer

Inclusivity

Learning Designer

Registry

Careers

Assessment overview

The medicinal chemistry research assessment is an individual written coursework in a question-and-answer format, exploring the questions medicinal chemists might consider when selecting a drug target and investigating potential drugs. Assigned in Year 2 towards the end of spring term, it also practices use literature to explore the topics that might be covered in a journal-style introduction and allows for some creativity in the use of a software called PyMOL (see figure 1) to visualise the binding interactions between a potential drug and a drug candidate.

Design decisions

Rationale for the assessment type

This assessment is designed as an assignment that draws on some of the work medicinal chemistry researchers might perform during a PhD or Industry project. The questions prompt students to consider concepts they would likely have to consider when working on a drug target. Medicinal chemistry is a subject which can involve a lot of memorisation, and this assessment aims to combat that by incorporating a learning-by-doing methodology that mimics real-world medicinal chemistry research.

Part 1 of the assessment features questions that centre on the choice of drug target and methods to identify potential drugs. This is designed as an opportunity for students to practice literature searching, formal writing, and to understand what is required in a journal-style introduction

Part 2 of the assessment involves students using the binding visualisation software PyMOL, using the images they generate to describe the binding of drug fragments to a protein target and to propose how to develop the component further.

Alignment with Learning Outcomes

The learning outcomes (LOs) that this coursework is most aligned with are:

- Explaining and evaluating methods for lead compound identification and optimisation including rational drug design
- Critically analysing binding of small-molecule drugs
- Comparing different biological targets

Along with the development and assessment of students' literature searching skills.

Practicalities

Fit with other assessments in the module and the programme

This assessment is delivered towards the end of Spring Term in Year 2. It builds on a similar question-and-answer assessment from Year 1, in which students are given one paper on a drug development project to read and use to answer short-answer questions, as a more-structured version of Part

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Role: Module lead and coordinator, coursework coordinator, lab design and assessment

Anatomy of Assessment

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1 of the Year 2 assessment.

In Year 3, students are asked to write full lab reports with in-depth introductions for the first time. Part 1 of this Year 2 assessment aims to prepare students for this, so they enter Year 3 well-equipped with an understanding of what is expected of them in an introduction.

Preparing students for assessment

Two optional, one-hour drop-in sessions were hosted on Teams, with one member of staff fielding questions from students. They were held in the first and third week of the assessment period. These were relatively popular with students and helped solve some queries that might have been difficult to answer via Blackboard Discussion Board.

Feedback and Marking

This assessment was marked by an individual member of academic staff, with check marking, so avoided the challenges posed by spreading marking across a team of academic staff of GTAs. One focus throughout the module design was to allow for feedback throughout, instead of only providing feedback at the end of the year, so that students can use previous feedback for the next module assessment. Individual feedback was provided through the Turnitin submission portal that students submitted their work on, within Blackboard. This was split into two sections: detailed question-by-question comments annotated on the script electronically, and a short summary bloc attached to the script. Whole-cohort feedback was also provided, as a written Word document in the Coursework Blackboard folder.

Advantages of the assessment type

- Stimulating to develop as directly interacting with current research projects and literature
- Scope for students to demonstrate different strengths compared to the exam
- Focus on application of knowledge; greater authenticity
- Designing tasks that imitate what students might be doing going into the industry aligns well with authentic assessment as it provides students with an opportunity to produce a piece of work that has meaning and value beyond the purposes of the assessment itself. This may lead to better engagement with the topic and better learning
- Timing provides feedback to me for remaining teaching
- Feedforward qualities of feedback making it useful for subsequent learning creating a bigger need to make use of feedback
- Assessment design that allows students to build up the necessary skills that they can take forward can facilitate student learning.
- Offering additional scaffolding in the form of drop in sessions is excellent practice when it comes to assessment preparation. This in combination with discussion boards gives the students a variety of channels to engage and seek support as they work through the assignment. Having 2 drop in sessions at different points prior to submission also creates an incentive to start working earlier.

Limitations of the assessment type

- Linking to live research creates risk of rapidly becoming outdated; regular revision required
- Not easily scalable without increased staffing
- Recent student data suggest that there is a breadth of time being spent on the assessment, with a few individuals spending almost 4 times as long as the upper recommended time (15 hours). Some further exploration of why students were spending this length of time is needed.
- Monitoring/understanding impact on student workload can be challenging

Advice for implementation

- Give students a guide on time required; seek feedback from them on time actually spent to help gauge if expectations are accurate.
- It is a really good practice to have in mind, and give students' guidance on, how many hours they should spend on the assignment. This should be communicated clearly from the start via different channels to keep the students to manage their expectations and appropriately direct their learning efforts.
- Plan in marking time into workload consideration for staff from the start.
- Good awareness of wider curriculum structure helps in focusing relevance and helping demonstrate benefits to students of wider skills and feedback.
- Use College supported educational tools to get

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maximum support with implementation and troubleshooting. Your Faculty Ed Tech team can advise on that.

- Offer additional support during the time that students are supposed to be working on the assignment. This might also help student to distribute their workload appropriately and manage their time better to monopolise on this extra support.
- The literature searching and aspects of write up could be difficult for students with dyslexia or specific learning difficulties. The reason for it are the difficulties with controlling the flow of information. When working with a bigger number of sources it can be difficult to structure the writing. This is where tools such as concept matrix alongside a visual spacial plan can be useful.
- Offer feed forward comments that students can apply to future learning if the structure of the programme or module allows for connectivity of modules and feedback