**Accredited Programme Title:- GSK Chemistry Continuing Education Programme:**  
Pathway A  
Module Specification Form

<table>
<thead>
<tr>
<th>Unit/Module Title</th>
<th>Drug Discovery</th>
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<tbody>
<tr>
<td>Code</td>
<td>GSK/Chem 4</td>
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<tr>
<td>Date of initial approval event</td>
<td></td>
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<tr>
<td>Proposed Level</td>
<td>HE Level 4 / NQF Level 7</td>
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<tr>
<td>Proposed General Credit Value</td>
<td>10 credits</td>
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<td>Brief Rationale</td>
<td>This in-house Drug Discovery Module comprises a series of lectures, delivered by GSK experts over several months, and totalling about 20 hours. In combination with &quot;on the job&quot; learning, individual reading, and attendance at other in-house or external symposia, the attendee will obtain a thorough understanding of the Drug Discovery Process, particularly within GSK, with a focus on current ‘best’ practice.</td>
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<td>Description of Learner (target audience)</td>
<td>The module is a component of the continuing framework of learning for new staff entering the company, primarily chemistry graduates in research. It is also suitable for those who have previous industrial experience, but who wish to build on their knowledge and appreciation of drug discovery. This group may include staff who initially joined the company without a first degree, but who have achieved an equivalent qualification by part time study.</td>
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<tr>
<td>Learning Hours</td>
<td>100 hours</td>
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| Learning Outcomes | On completion of this module, participants should be able to demonstrate an understanding of:  
  - The overall Drug Discovery Process, in general and specifically at GSK (A1, A3, B1b)  
  - Which Key Target Classes are the subject of research by GSK, and the rationale for this focus (A1, A3)  
  - The processes involved in the generation and optimisation of a “Hit” (A1, A3, B1b, B1c)  
  - The criteria that define a good “Lead”, including developability enablers (A1, A3, B1b, B1c)  
  - The Lead Optimisation Process (A1, A3, B1b, B1c)  
  - The value of Computational Chemistry in the Drug Discovery Process (A1, A3, B1b, B1h, Cm, Cn, Co, Cs, Ct); this is integrated into other lectures  
  - The key importance of pharmacokinetics, metabolism and safety to Drug Discovery (A1, A3, B1b, B1h, Cm, Cn, Co, Cs, Ct)  
  - The key phases of Drug Development and what is involved in each (A1, A3, B1b, B1h, Cm, Cn, Co, Cs, Ct)  
  - The issues involved with Intellectual Property (A1, A3, B1h, Co, Ct) |
| Indicative Unit content | The subject matter covered in the lectures will include the following:  
  - The Drug Discovery Process  
  - Biological Target classes  
  - The generation of a “Hit” and its optimisation to provide a “Lead”  
  - The Lead Optimisation Process |
### Assessment specification
Successful completion of the module will require the participant to pass both a written report and a *viva voce* examination.

The participant will be required to write a report of 2500 words maximum (minimum 2000 words), including chemical structures. This report will exemplify how material from at least two topics of the module have (or may have) impacted an ongoing GSK research programme and the implications. Cross referencing to recently published literature and/or internal/external lectures will be required.

The *viva voce* examination will be conducted by two selected senior/experienced members of staff, who have a recognised track record in drug discovery and therefore a good appreciation of the level of knowledge and understanding we wish to assess. To initiate the science-driven discussion, the participant will be asked to discuss a particular drug discovery topic or issue of their own choice (using visual aids, as required). Through thoughtful questioning of the topic and additional related areas, the assessor will seek to establish that the participant has the appropriate knowledge and understanding at Masters level. The participant will be expected to engage in a high quality discussion rather than show adequate responses to a pre-set list of questions. This is an established practice at GSK.

The assessors will write a formal report, indicating whether the participant has successfully passed the module.

Clear guidelines and training where appropriate, will be provided to the assessors on how to conduct the *viva voce* examination, and the expected level of knowledge and understanding that the participant is required to demonstrate in order to pass the module. This will clearly be directly related to the Learning Outcomes described above.

The external examiner will have access to:
- The participant’s report
- The participant’s visual aids for *viva voce* examination
- Assessors’ report

### Learning support/indicative reading and resources
- In conjunction with the lectures, a number of Case Histories (typically two, from different disease areas) will be presented by GSK programme scientists. These will provide an excellent opportunity to reinforce the concepts discussed in this module.
- The attendees also have the opportunity to attend
  - in-house symposia, focusing on aspects of drug discovery within GSK research;
  - external conferences including drug discovery and
medicinal chemistry presentations from other pharmaceutical organisations.

- All participants are encouraged to discuss session topics with their supervisor, other participants/chemists or mentors.
- For most lectures of the module, a relevant textbook is recommended and references to recent literature are provided by the speaker. Here are some examples:

5. Drug like properties and the causes of poor solubility and poor permeability, C A Lipinski, Pharmacological Toxicological Methods, 2001, 44, 235-249

- All participants have unlimited access to internet facilities allowing access to a huge volume of relevant literature.
- The participant is entitled to support from their supervisor in the preparation of the report amounting to annotation and review of two drafts. The supervisor can provide advice and input into formatting and direction, but is not permitted to add technical content.
Drug Discovery Module Assessment Form

Candidate Identification
Number: ...........................................................................................................

Assessors: ...........................................................................................................

Assessment Criteria

*Fail*
The areas selected for discussion are poorly exemplified and little understanding is evident (see evaluation guidelines).

*Pass*
The areas selected for discussion indicate that the participant has a good overall understanding and appreciation of the drug discovery process. The participant demonstrates breadth of understanding across the majority of topics. There is some evidence of further research to increase understanding of specific drug discovery activities.

**Assessors’ evidence**
Please give examples of where the report and *viva voce* examination provide the relevant evidence of achievement (refer to evaluation guidelines for Drug Discovery)

**Report**

Logic flow

Overall clarity

Technically accurate

Referencing

Evidence of further study (reading, lectures, etc)

Context/application of drug discovery concepts into GSK work

Appropriate breadth, depth and integration of topics covered
**Viva voce examination**  
Please indicate the evidence as it relates to those topics chosen by the participant and also those additional topics that have been discussed

*Technical*

Engaged in detailed scientific discussion

Generated and prioritised suggestions/ideas

Used nomenclature and vocabulary accurately

Showed breadth of knowledge and evidence of further study (within research department or wider literature)

Aware of impact and implications for GSK

*Behavioural*

Fluidity of discussion

Clarity of logic
Enthusiasm for material

 Recommendation: Pass or Fail
 Please outline any particular areas of strength or, if fail, which of the above were not of the
 required standard

 Signed: (Assessor 1) Date:
 (Assessor 2)
Evaluation Guidelines for Drug Discovery Module

In the participant-led discussion, and in the questions from the assessors, the participant should be able to demonstrate that they have assimilated and understood the content of the module. If possible, the discussion should relate material in the module to the participant’s current/recent research programme, another programme ongoing at their site or a retrospective analysis of a completed research project (perhaps a marketed product). The discussion should demonstrate that the participant:

- Understands the organisation underlying GSK R&D and the relationships of platform technology and science (PTS), the therapy area units and the Development organisation.
- Understands the necessity for continued research into new medicines, possibly with reference to current research programmes.
- Understands the approaches taken towards the identification of a chemical structure as a “Hit” in an area of research, and the process taken to optimise this structure.
- Understands how criteria are defined for a “Lead”, differentiating between key requirements and “developability enablers”.
- Appreciates how these criteria are adapted during the optimisation of the “Lead” to the “Candidate”.
- Understands the Lead Optimisation Process, including the interdisciplinary nature of the research.
- Shows an appreciation of the range of molecular properties that can influence biological activity and attrition risk.
- Has an appreciation of the role of computational chemists during the different stages of drug discovery.
- Understands the key role within drug discovery of the study of pharmacokinetics, pharmacodynamics and metabolism; has an understanding of key terminology, especially where relevant to current research area.
- Has an appreciation of the phases of Drug Development, including the timescales and associated costs.
- Has an overall understanding of the key issues associated with Intellectual Property in connection with drug discovery, and an understanding of the role of the synthetic and medicinal chemist in this area.
- Has an appreciation of the different requirements of and approaches to drug discovery/development that arises from the variety of diseases and modes of drug delivery with GSK research.