GlaxoSmithKline Research Chemistry Continuing Education Programme

Degree and Programme Title: Postgraduate Certificate in Professional Development (Research Chemistry)

1. Awarding Institution/Body: University of Kent
2. Teaching Institution: GlaxoSmithKline
3. Teaching Site: Stevenage
4. Programme accredited by: N/A
5. Final Award: Postgraduate Certificate
6. Programme: Research Chemistry
7. UCAS Code (or other code): 
8. Relevant QAA subject benchmarking group(s): Chemistry
9. Date of production/revision: September 1st 2012
10. Applicable cohort(s): 

11. Educational Aims of the Programme
   The programme aims to:
   
   • develop in participants, through an education in chemistry, a range of transferable skills of value in their career progressions
   
   • provide participants with a broad and balanced expansion of their chemical knowledge and practical skills, which they can utilise to enhance their overall job performance and which they can also apply to the solution of problems and issues encountered in their day-to-day work
   
   • ensure that they continue their scientific training and development in those aspects of Chemistry and related areas that are particularly relevant to the work of research chemists at GSK
   
   • involve participants in an intellectually stimulating and satisfying experience of learning, enhancing their enthusiasm for their work
   
   • empower employees who entered the company at graduate level to compete for senior positions within GSK
### Programme Outcomes
The programme provides opportunities for students to develop and demonstrate knowledge and understanding, qualities, skills and other attributes in the following areas. The programme outcomes have references to the subject benchmarking statement for Chemistry (Master’s level).

#### A. Knowledge and Understanding
On successful completion of this programme, participants will be able to:

1. apply advanced knowledge in chemistry to provide direct intellectual input into the progression of ongoing drug discovery programmes;

2. demonstrate a knowledge of recent advances within the field of Synthetic Chemistry and in related areas, including:
   - Reaction Selectivity: Protecting Groups
   - Retrosynthesis
   - Catalytic Organometallic Chemistry: Palladium
   - Oxidation and Reduction
   - Carbonyl and Enolate Chemistry
   - Green Chemistry
   - Aromatic Chemistry
   - Reactions of Heterocycles
   - Phosphorous and Sulphur
   - Boron and Silicon
   - Rearrangements
   - Physical Organic Chemistry
   - Heterocyclic Assembly
   - Catalytic Organometallic Chemistry: Beyond Palladium
   - Reactive Intermediates
   - Pericyclic Reactions
   - Asymmetric Synthesis
   - Biological Chemistry

3. demonstrate knowledge and understanding of the drug discovery process;

4. evaluate critically internal and external sources of chemical data/information and their content;

5. demonstrate understanding of structure searching methods – isomeric, substructure searching, similarity etc.;

6. demonstrate understanding of the theory underlying the commonly used purification and analytical techniques;

7. demonstrate an understanding of relevant research methodologies and techniques, and their appropriate application within their research field.
B. Skills and Other Attributes

On successful completion of this programme, participants will be able to:

1. Chemistry-related cognitive abilities and skills
   a. discuss chemistry with confidence in the work context and with other chemists of a range of experience and seniority;
   b. utilise the growing body of knowledge towards the efficient achievement of project goals;
   c. apply knowledge and understanding to the solution of qualitative and quantitative problems of a familiar and unfamiliar nature;
   d. recognise and analyse novel problems and develop strategies for their solution;
   e. demonstrate skills in the evaluation, interpretation and understanding of chemical information and data including computational and data-processing skills relating to chemical information;
   f. demonstrate skills in the clear and correct presentation of scientific material and arguments, in writing and orally;
   g. analyse critically their findings and those of others;
   h. demonstrate appreciation of good research practice in the discipline at GSK;

2. Chemistry-related practical skills
   i. demonstrate skills in the operation of in-house apparatus and instrumentation, particularly that used in purification and analysis;
   j. apply the developing practical abilities towards the efficient realisation of project goals;
   k. interrogate data derived from laboratory observations, particularly from spectroscopic studies, including the demonstration of proficiency in the use and application of:
      i. LC-MS as a key analytical technique
      ii. proton NMR spectroscopy in structure elucidation and evaluation of compound purity;
   l. observe Health and Safety requirements relevant to their role and pay due regard to personal safety and the safety of others.
**C. Transferable and Professional skills**

On successful completion of this programme, participants will be able to demonstrate that the following skills have been enhanced to postgraduate level:

m. written and verbal communication skills, including the ability to: write and present clearly and in a style appropriate to the purpose; construct coherent arguments and articulate ideas clearly at a high level with scientific members of staff; constructively defend research outcomes; effectively support the learning of others when engaged in teaching, mentoring or demonstrating activities;

n. problem-solving skills, relating to qualitative and quantitative information, extending to situations where evaluations have to be made on the basis of limited information;

o. information-retrieval skills and literature interrogation in relation to primary and secondary information sources, including retrieval through on-line computer searches;

p. interpersonal skills, relating to the development and maintenance of co-operative networks and working relationships with supervisors, colleagues and peers within GSK and the wider research community;

q. study skills needed for professional development;

r. business skills including time-management;

s. personal effectiveness skills including: a willingness to learn and acquire knowledge; being creative, innovative and original in their approach to research; recognition of boundaries and the use of sources of support as appropriate; showing initiative, working independently and being self-reliant in a team environment; displaying thoroughness and reliability;

t. display the ability to conceive/develop ideas, discuss these with colleagues, plan and implement resulting work

u. take ownership of, and demonstrate commitment to, continued professional development.

For more information on which modules provide which skills, see the attached module mapping.

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**Programme Structures and Requirements, Levels, Modules, Credits and Awards**

To achieve the postgraduate certificate, participants must achieve 60 credits at master’s level from a combination of mandatory and optional modules. The programme is delivered and assessed entirely in the workplace and is normally completed within three years from the point of enrolment.

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<td>IT Tools for Chemists</td>
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Work-Based Learning

The programme has been designed to be entirely work-based and/or work related. It builds on existing arrangements at GSK for continuing development and training, with the addition of robust assessment processes. The formal scientific training programme is well established and is provided in a range of formats by internal and external experts, the latter being mainly academic staff from university chemistry departments. The formal programme supplements “on the job” training provided by immediate supervisors, mentors and other GSK experts. Supervisors are actively encouraged and supported in their role to provide additional training and support to the participants, and will regularly review and build on the information taught in the structured sessions. Furthermore, GSK R&D has a company-wide mentoring network whereby any employee is able to assess their development needs, find a suitable mentor from a dynamic database, and create an individualised mentoring agreement.

Support for Students and their Learning

Participants are supported at every stage of the process, especially by the programme leader and the programme administrator. In the work-based learning context of GSK, supervisors are always on hand to support participants on a day-to-day basis to provide guidance and support as needed. More formally, they work through with participants the answers they have given to the tutorial problems that are set in the Synthetic Chemistry modules, and the IT and Purification modules are assessed by the supervisors. In the context of annual review, supervisors consider what additional on-the-job development opportunities and experiences will help the participant in reaching their career goals, and what further scientific and non-scientific courses may be of value. Participants have a wealth of resources to call upon; in addition to the Participants Guide, GSK has state of the art laboratory facilities, equipment and tools. Furthermore, as GSK recruits many of its staff at postdoctoral level from top institutions worldwide, participants have the opportunity to draw on the wide range of expertise and specialist knowledge of colleagues to support them through the programme.

Participants all have their own laptops which gives them access to various forms of on-line support, including electronic library access. The customised collection of information resources from The Library includes:

- Over 4000 electronic journals and 1600 electronic books;
- Search literature databases: Scopus, Embase and Searchlight (conference abstracts);
Participants are also able to access directly the many specialist IT tools that are available and a wide range of scientific and other courses through the GSK *MY Learning* environment.

**Entry Profile**

Any GSK chemist entering the company at graduate level is recommended to participate in the continuing education programme at GSK and would therefore be expected to register to receive academic credit and the subsequent postgraduate certificate.

**Methods for Evaluating and Enhancing the Quality and Standards of Teaching and Learning**

**Mechanisms for review and evaluation of teaching, learning, assessment, the curriculum and outcome standards**

The standard of the programme is maintained through effective internal and external monitoring procedures, including: the Programme Management Committee, which receives and acts upon feedback from participants, tutors and module leaders; the annual monitoring reports; meetings of the Assessment Panel and the reports given by External Examiners, both orally at the Assessment Panels and through their formal reports to the University. Through the Programme Management Committee, participants are involved in the discussions leading to the production of the Annual Monitoring Report. Through these mechanisms, the programme is constantly reviewed and enhanced, as feedback from tutors and participants has led to changes that have ensured the continuing relevance and currency of the programme.

**Mechanisms for gaining student feedback on the quality of teaching and their learning experience**

Module content and delivery is closely monitored. For example, both participants and tutors complete evaluation forms after each formal lecture and tutorial session of the three Synthetic Chemistry modules and on completion of the other modules. Each set of evaluation forms for each module is collated into a summary document and presented to the next meeting of the Programme Management Committee.

This committee has student representation and all participants are made aware of the date of its meetings and are given the names and contact details of the representatives.

**Pathway Outcomes Mapped with Individual Modules**
The table below maps the Pathway Outcomes listed on pages 1-4 of this document to the Learning Outcomes of individual modules. For example, A3 “demonstrates knowledge and understanding of the drug discovery process” is addressed through the learning outcomes of the modules “Drug Discovery”, “IT Tools for Chemists” and “Advanced IT Tools for Chemists”; the latter two modules provide the skills for the analysis of scientific data, to enable the design of further molecule structures.

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SC1: Synthetic Chemistry Module 1  
SC2: Synthetic Chemistry Module 2  
SC3: Synthetic Chemistry Module 3  
DD: Drug Discovery  
P&A: Techniques for Purification and Analysis  
IT: IT Tools for Chemists  
ITadv: Advanced IT Tools for Chemists  
P&PD: Personal and Performance Development