A21: Scientific Method, Investigation, Analysis & Evaluation

Portfolio Evidence Checklist (tick in the appropriate column where you have evidenced each Learning Outcome)

Centre Number:	**Candidate Number:**			
Content	Learning Outcome	Essay	Plans/ Lab Book	Report
7.1 The scientific method	7.1.1 demonstrate an understanding of what makes an investigation scientific: • demonstrate an understanding of negative results; • generate ideas for the areas in science that interest them and for associated experimental work; • identify factors that make a good scientific investigation; and • state their choice of area for experimental research;			
	7.1.2 demonstrate an understanding of the requirements for technical writing in scientific communication;			
	7.1.3 use information resources: • identify, locate and extract relevant information from up to 10 sources; and • use the Harvard system to reference the sources;			
	7.1.4 demonstrate knowledge of statistical concepts including mean, median, mode, variance, standard deviation, normal distribution, inferential statistics, null hypothesis, alternative hypothesis, significance, probability and confidence levels: • choose a statistical test; and • use a computer spreadsheet for descriptive statistics; and			
	7.1.5 demonstrate an understanding of Design of Experiment (DoE), using a computer spreadsheet to produce results, if applicable.			
	7.1.6 ensure the quality of their investigation: • Good Laboratory Practice (GLP); • Good Manufacturing Practice (GMP); • Good Clinical Practice (GCP); and • use of checklists;			
	7.1.7 demonstrate an understanding of health and safety requirements: • risk assessment; • elimination or minimisation of identified risks; and • physical resources;			
7.2 Scientific investigation	7.2.1 choose a suitable scientific investigation;			
	7.2.2 write a referenced literature review, analysing the research information and discussing its relevance to the planned experiment;			
	7.2.3 use investigation design principles: • formulate an aim (or aims); • identify independent and dependent variables; • write a hypothesis; • evaluate different approaches considered for the investigation, justifying the hypothesis chosen; • state proposed analytical techniques to be used; • assess possible errors in practical work; • assess health and safety – identify hazards, perform a risk assessment, record risk control in the laboratory and perform a Control of Substances Hazardous to Health (COSHH) assessment (where necessary); • identify any ethical issues; • identify resources and how they will obtain them; • identify any training needs for using new equipment or techniques; and • identify milestones; and			
	7.2.4 produce a draft project plan.			
	7.2.5 conduct a trial of the experimental work: • define the method; • analyse results; and • review and update all aspects of the project plan;			
	7.2.6 produce a realistic project plan for a scientific investigation: • conduct a scientific investigation; • keep a record of health and safety protocol; • describe the use of equipment and/or lab techniques; • demonstrate GLP; and • ensure accuracy and precision of results;			
7.3 Scientific analysis	7.3.1 perform scientific analysis, taking into account: • organisation of data; • statistical analysis; • units and dimensions; • assessment of accuracy and precision; • reproducibility and reliability; and • errors and how to reduce them;			
7.4 Scientific evaluation	7.4.1 present results and statistical data analysis in an appropriate format;			
	7.4.2 state a conclusion; and			
	7.4.3 produce a scientific evaluation.			