University of the West of England
BRISTOL

CORPORATE AND ACADEMIC SERVICES

MODULE SPECIFICATION

Part 1: Basic Data						
Module Title	Science and Instrumentation in Current Nuclear Medicine Practice					
Module Code	UZYSQ4-15-M		Level	M	Version	1
Owning Faculty	Faculty of Health and Life Sciences		Field	Allied Health Professions		
Contributes towards	MSc Nuclear Medicine					
UWE Credit Rating	15	ECTS Credit Rating	7.5	Module Type	Project	
Pre-requisites	None		Co- requisites	None		
Excluded Combinations	None		Module Entry requirements			
Valid From	October 2013		Valid to			

CAP Approval Date	9/7/13

Part 2: Learning and Teaching	
Learning Outcomes	On successful completion of this module students will be able to: • Demonstrate an understanding of basic nuclear medicine physics and interaction of radioactive substances with matter (component A, element 1) • Understand the fundamentals of Single Photon Emission Computed Tomography/Computer Tomography (SPECT/CT) and Positron Emission Tomography/Computer Tomography (PET/CT) systems, including an understanding of basic CT physics relevant to the hybrid environment (component A, element 2) • Evaluate the formation and decay of radionuclides and associated practical radiation protection measures (component A, element 2) • Demonstrate an understanding of gamma camera and SPECT/CT gantry designs, and other devices for radiation detection (component A, element 2) • Critically evaluate methods of acquisition, image manipulation and archiving (component A, element 2) • Critically evaluate the fundamentals associated with the provision of an

	optimal clinical nuclear medicine service (component A, element 1) • Demonstrate problem solving abilities with reference to decay calculations for various radioactive isotopes (component A, element 2) • Discuss the fundamentals of radiation biology and dosimetry, with reference to patients, carers and staff (component A, element 2) • Evaluate safe working practice andthe role of the modern practitioner within a nuclear medicine environment (component A, element 2) • Apply knowledge of hybrid equipment function and dosimetry to clinical decision-making (component A, element 2) • Understand the fundamentals of quality control procedures performed within a modern nuclear medicine department (component A, element 1) • Apply theoretical knowledge within clinical practice to safely handle unsealed radioactive sources and produce optimum images (component A, element 1)
Syllabus Outline	• Physics of radionuclides and interaction with matter • Formation and decay of radionuclides • Principles of radiation detection and instrumentation • Radiation detection systems • Overview of SPECT/CT and PET/CT systems • Fundamental system performance, testing and analysis • Computing applied to nuclear medicine • Correct use of nuclear medicine equipment to obtain optimum images • Radiation dosimetry • Practical radiation protection and associated legislation
Contact Hours	Contact hours will be achieved through a blended learning approach that will include distance based education supplemented by knowledge exchange events. This distance based education will embrace the University's current vision associated with Technology Enhanced learning. Such learning will include but not be limited to, asynchronous delivery of lecture material through narrated presentations, notes and other guided reading, VLE discussion board fora with specific objectives, workplace tasks, and other study tasks deemed appropriate to the development of student knowledge. An approximated breakdown of contact hours can be seen in the section below Formative feedback on allocated study tasks will be provided. Contact with the module leader for discussion of module related issues will be facilitated by e-mail, phone conversations and through interaction at the knowledge exchange events.
Teaching and Learning Methods	The learning and teaching strategy for this module has been developed to show achievement of a good level of understanding of physical principles of nuclear medicine, equipment design and operation, practical application, quality assurance and understanding of relevant legislation and guidelines governing nuclear medicine practice. The student will understand the essential principles determining optimum image quality, equipment operation, safe and effective practice, and radiation dose optimisation. To ensure engagement in the module learning opportunities, assessment will be linked to involvement in and contribution to discussion boards where specific

	tasks will be set. The tasks will be constructed to ensure that the module learning outcomes must be addressed.Contributions to these tasks will form source material from which students may extract content to add to their portfolio for assessment. Experience from other modules using this format indicates the potential for valuable discussion relating to the module content and helps ensure timely engagement as opposed to leaving personal study and revision to the end of the module delivery. The capacity to engage in debate with peers helps to facilitate networking, peer/shared learning and knowledge exchange. A variety of approaches will be used including; narrated presentations, video presentation material, discussions, seminars, workshops, and article review. Additional student centred learning guided by tutorials and discussion will include • Evaluation and discussion of current working practices • Directed practical exercises at student place of work (or suitable secondment) **Scheduled learning** will include upto 40 hours engaged with lectures, video presentation, seminars, tutorials, discussion board entries, project supervision, work based learning. **Independent learning** will include upto 110 hours engaged with essential reading, assignment preparation and completion etc.
Key Information Sets Information	NA – Postgraduate module
Reading Strategy	**Core readings** Any essential reading will be indicated clearly, along with the method for accessing it, e.g. students may be required to purchase a set text, be given a printed study pack or be referred to texts that are available electronically or in the Library. Module guides will also reflect the range of reading to be carried out. **Further readings** Further reading will be required to supplement the set text and other printed readings. Students are expected to identify all other reading relevant to their chosen topic for themselves. They will be required to read widely using the library search, a variety of bibliographic and full text databases, and Internet resources. Many resources can be accessed remotely. The purpose of this further reading is to ensure students are familiar with current research and material specific to their interests from the academic literature. **Access and skills** The development of literature searching skills is supported by the Library Services web pages which include interactive tutorials on search skills, the use of specific electronic library resources, evaluating information and various referencing styles. Students will be encouraged to access such resources in order to fully utilise the available range of online help. Further support will be provided by the module team again through the creation of narrated presentations

	Blackboard This module is supported by Blackboard where students will be able to find all necessary module information. Direct links to information sources will also be provided from within Blackboard.
Indicative Reading List	***Available as Online books through UWE library website*** Biersack, H.E.and Freeman, L.M. (2008) *Clinical nuclear medicine.* [online] New York: Springer Verlag. [Accessed 15 April 2013]. Delbeke, D. and Israel, O. (2010) *Hybrid PET/CT and SPECT/CT Imaging: A teaching file.* [online] New York: Springer. [Accessed 15 April 2013]. Elgazzar, A.H. (2011) *Concise Guide to Nuclear Medicine.* [online]New York: Springer Verlag. [Accessed 15 April 2013]. Kim, E.E. et. al. (2012) *Handbook of nuclear medicine and molecular imaging: principles and clinical applications.* [online]New Jersey: World Scientific. [Accessed 15 April 2013]. Magdy, K. (2011) *Basic sciences of nuclear medicine.* [online] New York: Springer Verlag. [Accessed 15 April 2013]. Thie, J.A. (2012) *Nuclear medicine imaging: an encyclopedic dictionary.* [online] New York: Springer Verlag. [Accessed 15 April 2013]. **Journals Resources** Seminars in Nuclear Medicine European Journal of Nuclear Medicine & Molecular Imaging Journal of Nuclear Medicine Clinical Nuclear Medicine Nuclear Medicine Communications Nuclear Medicine and Biology All journals can be found using the library search on the library webpages (http://www1.uwe.ac.uk/library/). Off campus users will be able to access journal articles using their UWE network username and password Alternatively, you can search for articles using a database (see below for a list of suitable databases), which will provide search and display facilities. **Databases** Anatomy TV Anatomy & Physiology Online Cinahl Cochrane Embase Medline Web sites such as: http://www.bnms.org.uk http://www.snm.org http://www.eanm.org

	http://www.anzsnm.org.au/ http://medical.nema.org/ http://www.nrpb.org.uk/ http://www.physics.isu.edu/radinf/risk.htm

Part 3: Assessment	
Assessment Strategy	A 1500 word assignment and 1000 word portfolio of discussion board extracts will demonstrate achievement of the learning outcomes. The 1500 word assignment based on a write-up of practical work in the student's department has consistently demonstrated very effective discrimination on the basis of sophistication of understanding of essential components of the process of image formation in nuclear medicine. Several learning outcomes can be assessed with it, and the process of undertaking the practical procedures is a very effective learning aid to the students. Those students limited by availability of test equipment in their own department are able to make use of model data provided by us. Element 1 - 1500 word assignment Indicative assignment title: Undertake a range of experimental tests on the gamma camera to determine and evaluate: i) The effect of an incorrect isotope photopeak energy setting on image quality ii) The practical effects of a) scatter b) collimator type c) distance d) counts on the system resolution Assignment guidelines: You are required to evaluate to the various aforementioned factors associated with image quality and write up as clinical experiments. You should access the on-line information, which provides video footage of the experiments being conducted and basic results / images obtained. You are encouraged to undertake these experiments within your own department, using appropriate quality control test tools (e.g. flood source, line source, bar phantom, Williams phantom, Perspex blocks). However, this may not be achievable due to the limited availability of quality control test tools. At a minimum, you should refer to the on-line information, in order to access details relating to the experiment methodologies and results / images obtained. Element 2 - 1000 word portfolio of discussion board extracts The portfolio will assess selected module learning outcomes. Inclusion of extracts from discussion board contributions ensures student engagement with the module content but also with peers for shared learning and debate. Formative assessment will be achieved by feedback on discussion board contributions from the module team, indicating where good understanding has been achieved or where there is scope for further

	exploration and development.

Identify final assessment component and element	**Component A element 2**	
% weighting between components A and B (Standard modules only)	**A:**	**B**:

First Sit	
Component A **Description of each element**	**Element weighting** **(as % of component)**
1.1500 word assignment	60%
2.1000 word portfolio of discussion board extracts	40%
Component B **Description of each element**	**Element weighting** **(as % of component)**
1.	
2.	

Resit (further attendance at taught classes is not required)	
Component A **Description of each element**	**Element weighting** **(as % of component)**
1.1500 word assignment	60%
2.1000 word portfolio of discussion board extracts	40%
Component B **Description of each element**	**Element weighting** **(as % of component)**
1.	
2.(etc)	
If a student is permitted an **EXCEPTIONAL RETAKE** of the module the assessment will be that indicated by the Module Description at the time that retake commences.	