MODULE DESCRIPTOR

<p>| | |</p>
<table>
<thead>
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<th></th>
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<tbody>
<tr>
<td><strong>TITLE</strong></td>
<td>Science and Technology of Medical Ultrasound</td>
</tr>
<tr>
<td><strong>SI MODULE CODE</strong></td>
<td>66-7886-01S</td>
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<tr>
<td><strong>CREDITS</strong></td>
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<td><strong>LEVEL</strong></td>
<td>7</td>
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<td>B800</td>
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<td><strong>SUBJECT GROUP</strong></td>
<td>Diagnostic Radiography</td>
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<tr>
<td><strong>DEPARTMENT</strong></td>
<td>Allied Health Professions</td>
</tr>
<tr>
<td><strong>MODULE LEADER</strong></td>
<td>Pauline Mitchell</td>
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**MODULE STUDY HOURS (based on 10 hours per credit)*

<table>
<thead>
<tr>
<th>Scheduled Learning and Teaching Activities</th>
<th>Placement (if applicable)</th>
<th>Independent Guided Study</th>
<th>Total Number of Study Hours</th>
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<tr>
<td>15</td>
<td>100 *</td>
<td>35</td>
<td>150</td>
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* these hours are indicative only and all students are expected to undertake 3 days per week placement activity for the duration of the course.

**MODULE AIM**

This module aims to provide the theoretical underpinning to support and compliment the practical training required to produce a competent Sonographer. It also enables the student Sonographer to examine the basic physical principles of safe application of high frequency sound in a variety of clinical settings. This module will enable you to evaluate and analyse images and using evidence based practice to critically evaluate equipment manipulation.

**MODULE LEARNING OUTCOMES**

By engaging successfully with this module you will be able to

- Critically evaluate clinical practice demonstrating an in-depth knowledge of the underpinning scientific principles
- Generate and evaluate ultrasound images and Doppler spectra for quality and artefacts both on screen and hard copy
- Critically evaluate and justify the use of equipment settings used in medical ultrasound and fault reporting procedures in the context of patient safety and image quality
- Critically evaluate new advances in technology with respect to image quality and recording and patient safety
INDICATIVE CONTENT

- Physics of sound, reflection and transmission of sound, absorption and attenuation coefficients.
- Piezoelectric production of ultrasound.
- Transducers for medical, diagnostic ultrasound equipment.
- Ultrasound pulses, beam shape, beam focusing and manipulation
- Doppler effect, Doppler instrumentation
- Application of Spectral, Colour and Power Doppler
- Power output, safety, physical aspects of ultrasound in human tissue.
- Equipment controls, accessories, image formation and storage.
- Current image storage systems
- Display and analysis of data
- Physics of image and Doppler artefacts encompassing all media and quality assurance.
- Image manipulation and patient management systems.
- New developments in technology and techniques
- Fault reporting and safety.
- Equipment evaluation for clinical application

LEARNING, TEACHING AND ASSESSMENT - STRATEGY AND METHODS

The module is delivered using blended learning such as informal and formal tutorials, practical sessions, student discussion, seminars and e-learning packages. The use of formal lectures is kept to a minimum. The multidisciplinary nature of the student cohort is used to advantage in that you are encouraged to actively participate through group discussion, sharing experience through practice in a range of ultrasound disciplines. This activity facilitates reflection and exchange of different practices, perspectives and current literature on the same topics, for example, the safe use of ultrasound imaging. Specialist visiting lecturers, such as applications specialists and physicists, are involved in delivering sessions that bring a tangible and relevant approach to the module delivery.

The University facilities for teaching and learning include two ultrasound machines, TV and abdominal mannequins, which you use on your initial introduction to the module. University facilities also include 6 workstations where image analysis can be carried out by students. Learning is also enhanced by the use of clinical simulation methods.

The assessment strategy includes both formative, feed-forward assessment throughout the module delivery and a final summative assessment to ensure you gain a breadth and depth of knowledge. An example of a topic area for the written summative assessment might be an equipment evaluation exploring the underlying scientific principles. Formative assessment is undertaken by a series of Computer Based Assessment tests that are released at timely intervals throughout the module delivery using the university's virtual learning environment. Formative assessment
will provide you with immediate feedback concerning your learning achievement and suggestions for further reading.

**ASSESSMENT TASK INFORMATION**

<table>
<thead>
<tr>
<th>Task No.*</th>
<th>Short Description of Task</th>
<th>SI Code</th>
<th>Task Weighting %</th>
<th>Word Count or Exam Duration**</th>
<th>In-module retrieval available</th>
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<tbody>
<tr>
<td>1</td>
<td>Course work - written assignment</td>
<td>CW</td>
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<td>3000</td>
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**FEEDBACK**

You will receive feedback on your performance in the following ways:

Feedback for the formative computer based tests will be provided immediately through the virtual learning environment.

Written feedback for the summative assessment will be provided in accordance with current university guidelines.

**LEARNING RESOURCES FOR THIS MODULE (INCLUDING READING LISTS)**

- Hill, C (2004) *Physical Principles of Medical Ultrasound*
- ter Haar, Gail. (2012), *The safe use of Ultrasound in Medical Diagnosis*. The British Institute of Radiology, 3rd ed

Reports

Articles
• British Medical Ultrasound Society (2000) Guidelines for the safe use of diagnostic ultrasound equipment. BMUS Bulletin 8: 3 30-33

Useful websites:
www.rcor.org
www.bmus.org
www.screening.nhs.uk/fetalanomaly/home.htm
SECTION 2  MODULE INFORMATION FOR STAFF ONLY
MODULE DELIVERY AND ASSESSMENT MANAGEMENT INFORMATION

MODULE STATUS - INDICATE IF ANY CHANGES BEING MADE

<table>
<thead>
<tr>
<th></th>
<th>NEW MODULE</th>
<th>EXISTING MODULE - NO CHANGE</th>
<th>Title Change</th>
<th>Level Change</th>
<th>Credit Change</th>
<th>Assessment Pattern Change</th>
<th>Change to Delivery Pattern</th>
<th>Date the changes (or new module) will be implemented</th>
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<td>09/ 2014</td>
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<tr>
<td>EXISTING MODULE - NO CHANGE</td>
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MODULE DELIVERY PATTERN - Give details of the start and end dates for each module. If the course has more than one intake, for example, September and January, please give details of the module start and end dates for each intake.

<table>
<thead>
<tr>
<th>Course Intake</th>
<th>Module Begins</th>
<th>Module Ends</th>
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<td>Course Intake 1</td>
<td>Sept 2014</td>
<td>02/2015</td>
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<tr>
<td>Course Intake 2 FT</td>
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</tr>
<tr>
<td>Course Intake 3</td>
<td>DD/MM/YYYY</td>
<td>DD/MM/YYYY</td>
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Is timetabled contact time required for this module? | Y

Are any staff teaching on this module non-SHU employees? | Y

If yes, please give details of the employer institution(s) below

NHS

What proportion of the module is taught by these non-SHU staff, expressed as a percentage? | 10%

MODULE ASSESSMENT INFORMATION

Indicate how the module will be marked

*Overall PERCENTAGE Mark of 50% | Y
*Overall PASS / FAIL Grade | N

*Choose one only – module cannot include both percentage mark and pass/fail graded tasks

SUB-TASKS

Will any sub-tasks (activities) be used as part of the assessment strategy for this module? | N

If sub-tasks / activities are to be used this must be approved within the Faculty prior to approval. Sub-task / activity marks will be recorded locally and extenuating circumstances, extensions, referrals and deferrals will not apply to sub-tasks / activities.

FINAL TASK

According to the Assessment Information shown in the Module Descriptor, which task will be the LAST TASK to be taken or handed-in? (Give task number as shown in the Assessment Information Grid in Section 1 of the Descriptor) | Task No. 1

NON-STANDARD ASSESSMENT PATTERNS

MARK 'X' IN BOX IF MODULE ASSESSMENT PATTERN IS NON STANDARD, eg MODEL B, ALL TASKS MUST BE PASSED AT 50%.

NB: Non-standard assessment patterns are subject to faculty agreement and approval by Registry Services - see guidance. notes.
<table>
<thead>
<tr>
<th>Date</th>
<th>Reason</th>
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