Information Processing in Medical Imaging

Title:
Information Processing in Medical Imaging

Module/Course Code:
TBA

Module/Course Title:
Information Processing in Medical Imaging

Details of any courses replaced by this course:
None.

Normal year of study:
MSc

Course level:
Postgraduate

Course value:
15 credits

Programmes in which this course is offered:
Mandatory for MSc Medical Image Computing. Optional for MSc Vision, Imaging and Virtual Environments (MSc VIVE).

Prerequisites:
None

Unsuitable for disabled?:
No

Exam Board:
Medical Physics and Bioengineering

Department teaching this course:
Medical Physics and Bioengineering

Course organiser:
Name: Dr David Atkinson
Email: D.Atkinson@ucl.ac.uk
Phone: 30201

Faculty:
Engineering Sciences

Can this course be taken as a short course?:
Not at present - please contact us if interested.

Is this course open to part-time or affiliate students?:
The course is open to part-time students of the MSc in Medical Image Computing.

Availability:
The module is available only to students on the 'Medical Image Computing' or 'Vision, Imaging and Virtual Environments' MScs in the Engineering Faculty.

Learning time:
Lectures: 30
Tutorials: 0
Laboratory classes: 12

Report, coursework writing and programming: 34
Independent project work: 34
Private Study: 40
Revision: 0
TOTAL: 150

Assessment:
Written exams (closed book): None
Written exams (open book): None
Oral exams or vivas: None
Written coursework: weighting 100%.
Practical exams: None

Teaching load:
Lectures (incl. preparation): 60
Tutorials (incl. preparation): 0
Laboratory classes (incl. preparation): 24
Marking of coursework: 25
Marking of exam scripts: 0
Annual revision time (e.g. revision of lecture notes and problem sheets):0
Other annual administrative load related to this module: 20

If this course is taught in programmes with different level of award, give details.:
Not applicable

Educational aims:
1. To provide students with practical experience installing and using medical image processing software. 2. To provide students with a knowledge and understanding of fundamental principles of medical image registration, classification and segmentation. 3. To provide a wide range of intellectual, practical and transferable skills that will allow students to develop careers in research, industry and other professional areas.

Course syllabus (outline):
* Technologies to measure change over time. 4D analysis of motion, fusion of multiple modality images. Registration theory and practice. * Image classification, Markov Random Fields, Monte Carlo Markov Chain methods, Bayes, MAP estimation. * Regulatory issues. Intellectual Property Rights, Copyright, licensing, quality assurance, regulatory approval, patient anonymisation, data protection. * C++ and Object orientated programming. * Hands-on installation and use of packages and libraries e.g. SPM, FSL, Insight toolkit, vtk, viewing software. * From voxels to information: tissue classification (supervised and unsupervised), object delineation. Segmentation algorithms in medical imaging e. g. MASS or Analyze.

Intended learning outcomes:
Upon successful completion of this module, students will: * know the fundamentals of medical image registration and image fusion, * be able to install and operate common medical image processing packages, * know the issues relating to regulatory approval of software, * know the fundamentals of medical image segmentation and classification, * know the basics of intellectual property rights relating to medical imaging software.

Reading list:
A reading list for the complete MSc in Medical Image Computing will be available from the course web site at http://www.ucl.ac.uk/cmic/msc

Details of any distance learning available:
None available

Details of any offsite teaching:
None available

Starting and review dates:
Starting date: September 2007
Date of the last review: Not applicable
Date of the next review: September 2008

Other Departments to which access is required:

Not applicable

How will the course be monitored?:
Student questionnaires, peer observation of teaching, staff/student committee, and periodic reviews by the Departmental Teaching Committee

Student numbers:
25. 20 from MSc in Medical Image Computing at steady state. 5 from the option on the VIVE MSc.

UG/PG overlap:
None

Assessment at different levels:
N/A

Is this course taught by more than one Department? If so, give details.:
No

Proportion of teaching in other departments:
Not applicable

Additional costs to students:
None

Additional resources:
None

Setup costs:
Set up costs are covered by EPSRC CTA funding.

Knowledge:
* Information Processing in Medical Imaging. * Medical image registration. * Medical image classification. * Medical image segmentation. * Regulatory issues.

Knowledge teaching methods:
Specialist knowledge is acquired through a combination of lectures, demonstrations, laboratory classes, computer based tasks, independent study and case studies.

Knowledge assessment methods:
Coursework.

Intellectual skills:
* The ability to analyse a problem and use appropriate scientific and professional tools to solve it. * The ability to evaluate and confront different methodologies of problem solving, development and design, develop critiques of them and propose alternative avenues where appropriate. * The ability to understand and analyse information and data. * Creativity and independence of judgement.

Intellectual skills teaching methods:
Intellectual skills are taught at the same time as specialist knowledge, using the same teaching methods.

Intellectual skills assessment methods:
Intellectual skills are assessed at the same time as specialist knowledge, using the same assessment method.

Practical skills:
* Installation of medical image processing software packages. * Programming skills using languages such as C++ and libraries such as vtk.

Practical skills teaching methods:
Practical skills are an integral part of this module. They will be taught in laboratory classes and by independent learning.

Practical skills assessment methods:

Practical skills are assessed through coursework.

Transferable skills:
* The ability to use information technology effectively. * The ability to learn computer languages. * The ability to understand the concepts and types of Intellectual Property Rights.

Transferable skills teaching methods:
Transferable skills are taught at the same time as specialist knowledge, using the same teaching methods.

Transferable skills assessment methods:
Transferable skills are assessed at the same time as specialist knowledge, using the same assessment method.

Amendments:
None.

Departmental approval:
Name:
Position:
Date:

External approval:
Name:
Position:
Date:

Faculty approval:
Name:
Position:
Date:

College approval:
Name:
Position:
Date:

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