MSc in Surgical & Interventional Sciences

Division of Surgery & Interventional Science
UCL
MSc in Surgical & Interventional Sciences

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INTRODUCTION

An MSc in Surgical Science has been running successfully at UCL for over 15 years. The course is run by the Division of Surgery & Interventional Science from the Royal Free Campus, UCL. The MSc is aimed at surgeons (but not exclusively) with at least two years training; it can be undertaken full-time (in one year) or part-time (flexible up to 5 years).

To reflect pivotal changes in overall training objectives and to keep pace with innovations in both surgical and scientific research, the course introduced a number of changes under the directorship of Professor M Loizidou (appointed 2012) and changed its name (in 2014) to the MSc in Surgical & Interventional Sciences. Importantly, the MSc now includes two separate ‘hands-on’ modules: *Advanced Microsurgical Skills* (*certificated*) and *Robotics*. The course also offers a wide range of optional modules, including Nanotechnology, Orthopaedics and Oncology.

**NOTE:** while the majority of optional modules are available from the Division of Surgery & Interventional Science, approval from both the module leader and the MSc Director is required for acceptance for any module. ALL modules are subject to change and availability.

The ethos of the MSc is to provide graduate teaching and research opportunities to junior surgeons with a two-fold aim:

1. To introduce trainee surgeons to in-depth scientific thinking, knowledge and practice as applied to surgery
2. To equip trainee surgeons with critical, analytical thinking and skills at Master’s level and provide equivalent qualifications to enable career progression

**Summary of course structure:**

The course offers a selection of compulsory and optional modules with the majority of the didactic teaching taking place in the autumn term. Students will be encouraged to explore and discuss potential research projects during this time. Research projects routinely start in the second term (as optional modules allow).

**Assessment:**

Each module is assessed individually: continuously for competencies (for hands-on modules), by examination with/without course work or by thesis. Examinations (and assessment of coursework) take place throughout the year, as appropriate per module. Students are expected to submit their thesis at the end of July.

**Additional opportunities:**

Students are encouraged to attend the diverse range of organized seminars and any of the lecturers offered by the Division, even if not part of their planned programme. Students are also encouraged to take advantage of events and training opportunities available via the UCL Graduate office and the wider UCL community.

**Learning outcomes:**

By completing the MSc, students will have acquired the following:

1. Microsurgical and Robotics training (two hands-on modules in surgical skills)
2. Abilities for critical thinking and analytical skills *(via research methodology module and research project)*
3. In depth knowledge of topics of their interest *(via optional modules)*
4. Solid grounding in research practices up to and including the ability to design own experiments to address scientific objectives *(via the research project)*

The graduates will be awarded appropriate certification for *Microsurgical Skills* training. Within the research project taken as part of the MSc, the graduates are strongly urged and supported to work towards publications and international presentations.
PROGRAMME

Academic Year: 2016-2017:

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<th>TERM</th>
<th>DATES</th>
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<tbody>
<tr>
<td>First term</td>
<td>Monday 26(^{th}) September 2016 – Friday 16(^{th}) December 2016</td>
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<td>Second term</td>
<td>Monday 9(^{th}) January 2017 – Friday 24(^{th}) March 2017</td>
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<tr>
<td>Third term</td>
<td>Monday 24(^{th}) April 2017 – Friday 9(^{th}) June 2017</td>
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The academic year for the MSc starts in mid-September, with the thesis usually submitted at the end of July (date to be confirmed). The Examination Board meeting and viva voce are held in September (date to be announced).

Course:
The MSc comprises 180 credits:

1. Three compulsory modules (15 credits each): *Research Methodology and Transferable Skills*, Advanced Surgical Skills (Robotics) and Advanced Surgical Skills (Microsurgery)
2. A compulsory Research Project (90 credits)
3. Three optional modules (15 credits each)

Modules & Codes:

**COMPULSORY**
- ORTHG007 Research Methodology and Transferable Skills (part 1)
- SURGGS12 Advanced Surgical Skills: Robotics
- SURGGS13 Advanced Surgical Skills: Microsurgery
- SURGGS99 Research Project

**OPTIONAL**
- A choice of THREE modules:
  - ORTHG008 Research Methodology and Transferable Skills (part 2)
  - SURGGB04 Stem Cells
  - SURGGS03 Surgical Oncology
  - SURGGS04 Experimental Models
  - SURGGS06 & SURGGS07 Systematic Reviews 1 & 2; taken together (total 30 credits)
  - SURGGN01 Nanotechnology
  - SURGGN04 Translation of Nanotechnology & Regenerative Medicine
  - SURGGN05 Biomaterials
  - SURGGN06 Applied Tissue Engineering
  - ORTHG011 / 12 Musculoskeletal Biology Part 1 / Part 2
  - ORTHG013 / 14 Musculoskeletal Biomechanics Part 1 / Part 2
  - ORTHG015 Clinical Experience in Musculoskeletal Surgery
  - ANATG042 Pain
  - PHOLG020 Heart & Circulation
MODULE DETAILS

COMPULSORY MODULES:

• ORTHG007 Research Methodology and Transferable Skills (part 1) [15 credits]
This module provides training in a range of generic skills necessary for (i) the planning of research and (ii) the written, oral and visual communication of science. In addition it provides working examples of the use of these skills in academic, clinical and industrial settings. The complexity increases stepwise and is supported by on-line exercises. The module runs every Tuesday afternoon (14.00 – 17.00) at the Bloomsbury Campus during the 1st term and is assessed by an MCQ examination in December, together with coursework (date to be finalized).

• SURGGS12 Advanced Surgical Skills: Robotics
A ‘hands-on’ Robotic Surgery and Laparoscopic course is delivered in the Chitra Sethia Centre robotic training centre at University College Hospital (UCH). The specialized surgical skills taught include:

(1) Basic robotics skills (camera manipulation, instrument knowledge, da Vinci, remote suturing)
(2) Intermediate robotics skills (focusing on different speciality needs, e.g., Urology, GI, Gynaecology)
(3) Advanced and novel techniques training to include:
   (a) new scopic based procedures (e.g, Endoscopic Mucosal Resection (EMR) and Endoscopic Submucosal Dissection (ESD)
   (b) FLEX procedures (laparoscopically assisted endoscopic resection)

The module is taught during the 1st term. Assessment is continuous and successful completion of the module results in intermediate level competencies in the field.

• SURGGS13 Advanced Surgical Skills: Microsurgery
Teaching for this hands-on module takes place at the dedicated surgical theatres of Northwick Park Institute of Medical Research (NPIMR). The module delivers specialized surgical skills which increase in complexity; specifically: vascular and microsurgical techniques.

Skills include:

(1) Assessment of the necessity for microsurgery
(2) Decisions as to protocol and procedures
(3) Set up and use of operating microscope
(4) Tissue dissection and vessel preparation
(5) End-to-end and end-to-side anastomoses
(6) Interrupted and continuous sutures
(7) Fault finding and repair

The module is taught in one week during the 2nd term. Assessment of competencies is continuous and successful completion is certificated. NPIMR is the only centre in the UK which provides formal certification for this training.

• SURGGS99: Research Project
The compulsory research project is worth 90 credits. An in-depth project is expected and encouraged; it will be assessed by submission of the dissertation, a short PowerPoint presentation and viva voce. We also actively encourage students to work towards conference presentations and potential publications. The following selections demonstrate the diversity of current research at UCL.
Examples of current working titles: Angiogenesis of seeded collagen scaffold using in vivo CAM analysis; Tendon reconstruction/ingrowth onto metal implants (Titanium 3D printed porous structure) with different surface coatings e.g. Hydroxypatite; A retrospective study on multi-parametric MRI in the diagnosis of prostate cancer; NGAL biomarkers as a prognostic marker in liver transplantation.

Examples of submitted thesis:

Lighting the Way for a Better Head and Neck Cancer Therapy using Photochemical Internalization (PCI)
National Medical Laser Centre, Division of Surgery & Interventional Science, London

Background: Bioavailability of cancer therapeutics can be impaired due to the poor ability of drugs to penetrate the cell membrane or because of entrapment within endocytic vesicles and subsequent degradation by lysosomal enzymes. Photochemical internalisation (PCI) is an enhanced delivery method based on the concept of photodynamic therapy (PDT). In PCI, light sensitive molecules known as photosensitisers are used in conjunction with the therapeutic drugs. While drugs are taken into the cell by endosomes, the photosensitisers localise preferentially in the endocytic membranes. Once illuminated, photosensitisers are activated to induce formation of reactive oxygen molecules; the latter rupture endocytic membranes and result in release of drugs. This enables the drug to reach its intended intracellular target. The main purpose of this study was to investigate the in vitro therapeutic effects of PCI and PDT on rat fibrosarcoma cell line (MC28). Saporin, a type 1 ribosome inactivating protein (RIP1), was used along with an anti-cancer taxane, Docetaxel. The photosensitisers employed were TPPS2a (Meso-Tetraphenyl Porphyrin Disulphonate) and Tat-TPP (Tat Peptide-Photosensitiser Biconjugate).

An in vivo Study of the Efficacy of Bioactive Glass-Based Calcium Phosphate Cements:
A Comparison with Hydroset™
Institute of Orthopaedics & Musculoskeletal Science, UCL, Royal National Orthopaedic Hospital, London

Background: Three novel bioactive glass-based cements have been designed for the purposes of investigating their effects on bone reaction and assessing their potential as synthetic bone substitutes, with particular interest in vertebroplasty and kyphoplasty applications. It was postulated that the incorporation of bioactive glasses into calcium phosphate cements would improve the bioactivity of the cements owing to the known advantageous features of bioactive glasses, including their osteoinductive capabilities and unique ability to bind to bone tissue. In this study, these bioactive glass-based calcium phosphate cements have been compared with the commercially available calcium phosphate cement Hydroset™.

Protein Expression of Genes Dysregulated by Endothelin-1 Stimulation in Colorectal Cancer
Division of Surgery & Interventional Science, UCL Medical School RF Campus, Rowland Hill St., London

Background: Colorectal cancer is the third most common type of cancer and the second most common cause of cancer-related death in the UK, with 15,919 deaths in 2009 alone. Unfortunately, the majority of patients present too late for curative surgery to be achievable. Even when they do present early, oncological resection is still compromised by the spread of radiologically undetectable micrometastases. Endothelin-1 (ET-1) has recently emerged as an interesting molecule that promotes colorectal cancer development and progression. Previous in vitro studies demonstrated that ET-1, through binding its ETA receptor, causes up-regulation of a number of genes involved in colon cancer development and progression. The current worked aimed to confirm expression of these genes in correlation with ET-1/ETA expression using immunohistochemistry and western blotting, in patient tissues.

Characterising Craniofacial Microsomia: A geometric Morphometrics Approach
Great Ormond Street Hospital, London

Background: Craniofacial microsomia (CFM) is the second commonest craniofacial deformity, with mandibular malformation a hallmark feature. The heterogeneous phenotype makes characterising the CFM mandible challenging. Geometric morphometrics (GM) is a powerful mathematical modelling technique that is useful in describing morphology. This study aims to assess the efficacy of GM in characterising CFM mandibular deformity across age groups and in comparison to the existing gold standard the Pruzansky-Kaban Classification (PKC).
Tendon Cell Attachment, Proliferation and Differentiation on Roughened, Hydroxyapatite and Silicon-substituted Hydroxyapatite Substrates

Background: Tenocytes and tendon stem cells (TSCs) have an essential role in tendon repair and homeostasis. Hydroxyapatite (HA) and silicon-substituted HA (Si-HA) coatings are known to enhance mesenchymal stem cell and osteoblastic activity, whilst promoting osteogenic differentiation. Aims of this study were to optimise electrochemically deposited HA and Si-HA coatings on roughened titanium discs, and assess the response of a mixed population of tendon cells on roughened, HA and Si-HA substrates.

The study of angiogenesis of seeded three-dimensional collagen scaffold using in vivo Chorioallantoic Membrane (CAM) analysis

Background: Adequate understanding on the processes involved in vascularisation of regenerative tissue is crucial to implant survival and is one of the major barriers in the progress of this field. This study aims to increase the understanding of basic biomolecular and cellular interactions of vascularisation by utilising collagen hydrogels seeded with endothelial cells (EC). The main object is to investigate the influence of co-culturing supporting cells and the effects of varying oxygen tension (normoxia and hypoxia) on the vasculogenesis and angiogenic potential of the seeded hydrogels using the Chorioallantoic Membrane (CAM) assay.

OPTIONAL MODULES: Select THREE modules from this group [a total of 45 credits]

- ORTHG008 Research Methodology and Transferable Skills (part 2)
  This module extends the skills learnt in ORTHG007 and is ideal for part-time MSc students. The course provides a series of lectures and workshops on statistical analysis of data as applied to specific projects. The module runs every Friday from 11.00 am followed by a compulsory Journal Club, from the end of January until the beginning of May at Stanmore RNOH. Assessment is by coursework.

- SURGG04 Stem Cells
  The syllabus will include a number of topics which will be important for the application of stem cells in surgery including: basic stem cell biology, sources of stem cells, methods to generate or isolate populations of stem cells, current regulations and ethical considerations for the use of human stem cells and applications of stem cell based therapies in the clinic. This module will act as a primer on stem cell biology and the potential therapeutic application of stem cells in surgery. Students will learn about ongoing research and applications currently available for patient care. The module will also address important ethical and regulatory concerns for the use of stem cells and potential scientific barriers to the use of stem cells in the clinic. Upon completing this module students will have an understanding of the basics of stem cell biology and the essential requirements for stem cell based therapies, pre and post operatively and in surgery; knowledge of which may be utilized going forward to the research project stage of the MSc. Assessment is by a final written exam (MCQ and SEQ) lasting 2 hours.

- SURGGS03 Surgical Oncology
  Cancer is one of the mostife and the second most common cause of death in the U.K. The majority of cancers are solid tumours and of these about 90% are carcinomas, commonly affecting the breast, bowel, prostate, lung, bladder and liver. The course presents the current cellular and molecular knowledge for this disease and how this knowledge has impacted on diagnosis and treatment of specific carcinomas. The aim is twofold: (i) to give an overview of cellular and molecular processes underlying the disease process (knowledge of the cell cycle, oncogenes and tumour suppressor genes is desired); (ii) to present common carcinomas in the context of the underlying processes and examine how our current cellular and molecular knowledge has supported new treatments. The module runs every Tuesday (am) starting end of October until December at the Royal Free Campus. Assessment is by coursework and examination (January).
**SURGGS04 Experimental Models of Research**

The use of in vivo models in surgical research has provided a vehicle to examine the role of many biological systems in the pathophysiology of disease progression. The module aims to: (i) give an overview of surgical procedures that have been used on animals to ensure that major organs such as the CNS, liver, kidney, together with the cardiovascular and musculoskeletal systems can maintain their normal function following disease or scientific intervention; (ii) illustrate the use of animal models as means to test or explore specific biological hypotheses; (iii) provide an insight into the appropriate use of experimental models in surgical research to advance and support new treatment for human disease as part of a portfolio of research strategies, while understanding the ethical and scientific need for refinement, reduction and replacement. The module runs for 3 weeks during the 1st term at the Royal Free Campus. Assessment is by examination in December (date to be finalized).

**SURGGS06 & SURGGS07 Systematic Reviews of Intervention [parts 1 & 2; total 30 credits]**

The delivery is on-line and supported by webinars. Assessment is by coursework

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<tr>
<td>1. Drafting the research question</td>
<td>1. Analysing the data</td>
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<td>2. Developing the criteria for inclusion of studies</td>
<td>2. Exploring heterogeneity</td>
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<td>3. Developing the search strategy</td>
<td>3. Assess reporting bias</td>
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<td>4. Selecting the studies for inclusion</td>
<td>4. Interpret the results</td>
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<td>5. Collection of data</td>
<td>5. Discuss the results in a systematic fashion</td>
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<td>6. Arrive at appropriate conclusions</td>
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**SURGG012 Evidence based pre-clinical research**

The delivery is on-line and supported by webinars. Assessment is by coursework

1. Choice of model for basic research
2. Accuracy
3. Precision
4. Sampling error
5. Measurement error
6. Sources of bias in molecular techniques and cell culture work

**SURGGN01 Nanotechnology in Medicine**

This module provides an introduction to nanotechnology and how the shift from classical to nanoscale science brings with it huge potential for medical applications in both diagnostics and therapeutics. Anatomical imaging is transformed to functional imaging; in the quantum universe nanoscale objects can be fine-tuned for highly specific, highly sensitive targeted treatments. Clinical imaging modalities (MRI, x-ray, CT) and cancer therapies (radiotherapy) and the current and future role of nanotechnology in these fields will be discussed. The module runs for two terms (1st & 2nd) every Thursday pm at the Royal Free Campus. Assessment is by coursework (20%) and examination (80%) in March/April (date to be finalized).

**SURGGN04 Translation of Nanotechnology & Regenerative Medicine**

Introduction to Translation of Nanotechnology and Regenerative Medicine: from “bench to bedside”. Students will learn about: Routes of Translation

1. GMP & Conformity of Assessment
2. The importance of IP
3. Avenues of investment
4. Ethical issues approval for clinical trials
5. Demonstrate awareness of investment avenues for commercialization
6. The economics concerning translation of an idea into a commercially available product

The module starts in the 1st term and runs through to the 2nd term every Monday pm at the Royal Free Campus. Assessment is by coursework.
• **SURGGN05 Biomaterials**
  An introduction to: material properties, biomaterial design, biomaterial manufacture and characterisation for regenerative medicine. This module will provide students with a basic understanding of biomaterial structure and properties, an understanding of material-cell interfaces and various approaches to modify materials to promote desirable cell responses (including nanoscale bio-functionalization and surface structuring). The module runs during the 1st term: every Tuesday (11.00 – 13.00) and every Monday during the 2nd term (10.00 – 12.00) at the Royal Free Campus. Assessment is by coursework (20%) and examination (80%; March/April; date to be finalized).

• **SURGGN06 Applied Tissue Engineering**
The module introduces students to the use of tissue engineering as a strategy to replace or restore a level of function to diseased or damaged tissue. Students learn how to direct cell behaviour (e.g. stem cell differentiation) through material design and world leading scientists and surgeons provide lectures on engineering specific tissues and discuss future strategies in scaffold design. The module is run every Friday (14.00 – 16.00) during the 1st and 2nd terms at the Royal Free Campus. Assessment is by coursework (20%) and examination (80%; March/April; date to be finalized).

• **ORTHG011 Musculoskeletal Biology Part 1**
The overall learning objective is that students are able to write a detailed account of the molecular composition and organisation of skeletal tissues, demonstrating an understanding of how this is regulated by cell activity in relation to function and biological environment in health. The account should be written with references but not access to key publications or techniques. The content should include at least 60% of information given in the teaching sessions and show evidence of additional information gained from private reading and peer discussions. The module runs daily for 3 weeks (except Tuesday & Wednesday: pm only) during October at Stanmore, RNOH. Assessment is by MCQ examination (50%; January) and coursework (50%).

• **ORTHG012 Musculoskeletal Biology Part 2**
Topics covered are arthritis, back pain and spinal disorders, musculoskeletal disorders in children, musculoskeletal sports medicine, osteoporosis and fragility fractures and high energy limb fractures. The module involves tutorials practical classes and small group working sessions; it runs all day every Monday during the 2nd term at Stanmore, RNOH. The course assessment is by MCQ examination (50%) and 50% by coursework (essay).

• **ORTHG013 Musculoskeletal Biomechanics Part 1**
Topics covered are: Forces & moments, joint loads and gait analysis. Design of artificial joints: properties of materials used for total joint prostheses. *In vitro & in vivo* measurement of strains: finite element analysis, instrumented and telemetry. Biomechanics of hard tissues: properties and behaviour of cortical and cancellous bone. Biomaterials: metals, ceramics & polymers. Surface properties: engineering & fixation and loosening of prostheses; lubrication and wear of total joint implants. Design of Total Knee Replacement (TKR), fixation and loosening of prostheses: biomechanics at the bone/implant interface. Biological interactions: wear particles and bone/biomaterials interface, *in vivo* biocompatibility & *in vitro* biocompatibility. Design of Total Hip Replacement (THR) Parts I & II: biomechanics of hard and soft tissues; bone repair and tissue engineering; cartilage repair and tissue engineering. The module runs every day for 3 weeks (except Tuesday & Wednesday: pm only) during October at Stanmore, RNOH. Assessment is by MCQ examination (50%), coursework (40%) and peer assessment (10%).
• **ORTHG014 Musculoskeletal Biomechanics Part 2**

Topics covered are: Arthritis: biomechanics of cartilage, joint loading, stem cells and biomaterials in arthritis; normal, pathological and replaced joints. Back pain: disc replacements, nano-coating for orthopaedic implant; spinal fusion and biomaterials of the spine, spinal implants and spine loading. Children: DDH and joint arthroplasty; scoliosis; bone tumour and grower implants. Sports: ligament and tendon reconstruction. Gait analysis: fragility fractures; stem cell treatment of osteoporosis; high energy trauma; ITAP; fracture fixation and blood flow; infected implants. The module runs all day on a Wednesday during the 2nd term at Stanmore, RNOH. Assessment is by coursework (80%) and discussion forum (MOODLE; 20%).

• **ANATG042 Pain**

This module aims to present an integrated approach to pain. Through a series of 18 lectures students will be presented with information about the basic mechanisms of pain and its clinical manifestations. Students will also be introduced to current ideas about therapy and management and to the problems inherent in measurements of pain. The module is taught at the Bloomsbury campus on Tuesday and Thursday mornings during the second term with a series of seminars based on reading topics held at the end of the module. Assessment is by examination (80%) and coursework (20%).

• **PHOLG020 Heart & Circulation**

Building upon primary knowledge of the heart and circulation, essential aspects of cardiac and vascular physiology will be considered which will enable a grasp of areas of experimental, applied and patho-physiology. The module aims to: provide contemporary views on cardiac and vascular function by covering heart and vascular physiology at a level beyond that found in standard text books; develop an understanding of cardiac and vascular function in relation to cellular mechanisms; link the treatment of cardiovascular diseases to basic mechanisms; apply the above to understand the pathology of various cardiovascular diseases. The module also aims to aid development of independent study skills as well as teamwork; facilitate the development of written and oral communication skills. The module runs on Monday mornings, Wednesday afternoons and all day on Thursdays during the first term. Assessment is by essay (12.5%), poster presentation (12.5%) and examination (75%).
# CONTACTS INFORMATION

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<th>CODE</th>
<th>MODULE TITLE</th>
<th>CAMPUS</th>
<th>MODULE LEADER &amp; CONTACT DETAILS</th>
<th>ADMINISTRATOR &amp; CONTACT DETAILS</th>
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<tbody>
<tr>
<td>SURGGS99</td>
<td>Research Project</td>
<td>Various locations</td>
<td>Dr Hazel Welch <a href="mailto:h.welch@ucl.ac.uk">h.welch@ucl.ac.uk</a></td>
<td>Mrs Ruth Williams <a href="mailto:ruth.williams@ucl.ac.uk">ruth.williams@ucl.ac.uk</a> 0207 794 0500 x34980</td>
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<tr>
<td>SURGGS12</td>
<td>Surgical Skills: Robotics</td>
<td>UCLH</td>
<td>Prof. John Kelly <a href="mailto:j.d.kelly@ucl.ac.uk">j.d.kelly@ucl.ac.uk</a></td>
<td>Mrs Ruth Williams <a href="mailto:ruth.williams@ucl.ac.uk">ruth.williams@ucl.ac.uk</a> 0207 794 0500 x34980</td>
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<tr>
<td>SURGGS13</td>
<td>Surgical Skills: Microsurgery</td>
<td>NPIMR</td>
<td>Prof. Paul Sibbons <a href="mailto:p.sibbons@ucl.ac.uk">p.sibbons@ucl.ac.uk</a></td>
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<tr>
<td>ORTHGO07</td>
<td>Research Methodologies (1)</td>
<td>UCL, Bloomsbury</td>
<td>Dr Catherine Pendegrass <a href="mailto:c.pendegrass@ucl.ac.uk">c.pendegrass@ucl.ac.uk</a> 0207 794 0500 x35584</td>
<td>Ms Stephanie McColl <a href="mailto:s.mccoll@ucl.ac.uk">s.mccoll@ucl.ac.uk</a> 0208 909 5494</td>
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<td>ORTHGO08</td>
<td>Research Methodologies (2)</td>
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<td>SURGGS03</td>
<td>Surgical Oncology</td>
<td>RFH</td>
<td>Dr Nikolitsa Nomikou <a href="mailto:n.nomikou@ucl.ac.uk">n.nomikou@ucl.ac.uk</a></td>
<td>Mrs Ruth Williams <a href="mailto:ruth.williams@ucl.ac.uk">ruth.williams@ucl.ac.uk</a> 0207 794 0500 x34980</td>
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<tr>
<td>SURGGS04</td>
<td>Experimental Models</td>
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<td>To be appointed @ucl.ac.uk</td>
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<tr>
<td>SURGGS06</td>
<td>Systematic Reviews</td>
<td>On-line</td>
<td>Dr Kurinchi Gurusamy <a href="mailto:k.gurusamy@ucl.ac.uk">k.gurusamy@ucl.ac.uk</a></td>
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<tr>
<td>ORTHGO011</td>
<td>Musculoskeletal Biology (1)</td>
<td>RNOH, Stanmore</td>
<td>Dr Scott Roberts <a href="mailto:scott.roberts@ucl.ac.uk">scott.roberts@ucl.ac.uk</a></td>
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<td>ORTHGO012</td>
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<tr>
<td>ORTHGO013</td>
<td>Musculoskeletal Biomechanics (1)</td>
<td></td>
<td>Dr Chaozong Liu <a href="mailto:chaozong.liu@ucl.ac.uk">chaozong.liu@ucl.ac.uk</a></td>
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<td>ORTHGO014</td>
<td>Musculoskeletal Biomechanics (2)</td>
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<tr>
<td>ORTHGO15</td>
<td>Clinical Experience in Musculoskeletal Surgery</td>
<td>RFH</td>
<td>Mr Arthur Galea <a href="mailto:arthur.galea@nhs.net">arthur.galea@nhs.net</a></td>
<td>Ms Helen Jefferson-Brown <a href="mailto:ucgahel@ucl.ac.uk">ucgahel@ucl.ac.uk</a> 020 7679 2200</td>
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<tr>
<td>ANATG042</td>
<td>Pain</td>
<td>Bloomsbury</td>
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<td>PHOLG020</td>
<td>Heart &amp; Circulation</td>
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