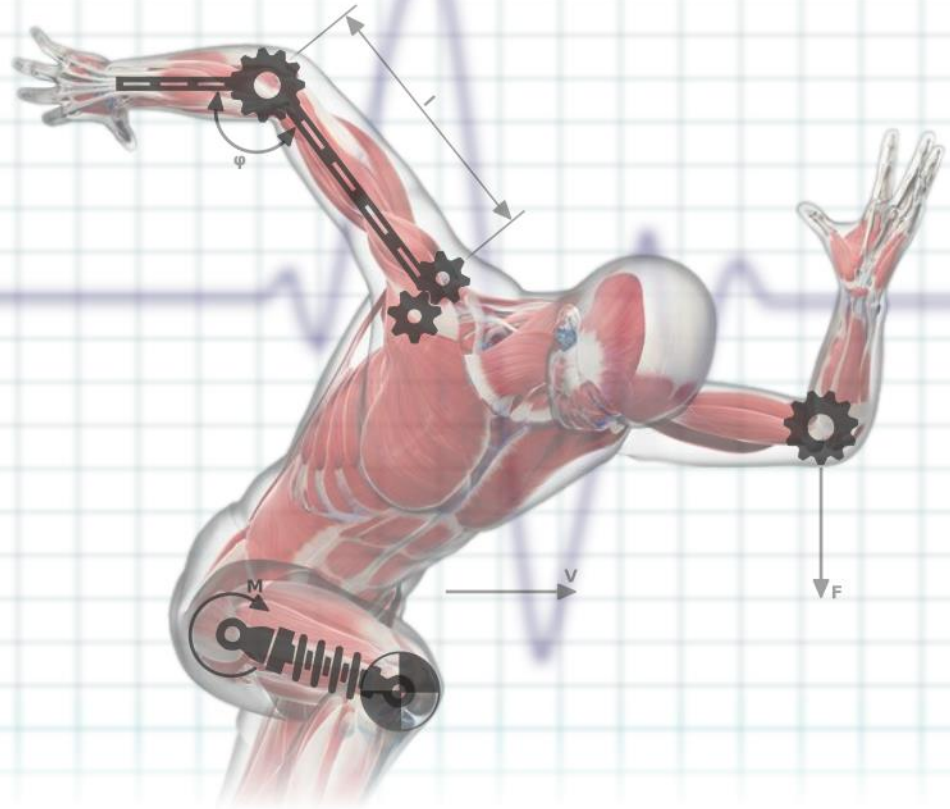
HELLENIC REPUBLIC

National and Kapodistrian University of Athens

A Brief Presentation of the New Postgraduate Programme:

"MSc Applied Biomechanics and Biomaterials in Orthopaedics"



1st Department of Orthopaedic Surgery, UoA,
1st Floor, "Attikon" University Hospital,
Rimini 1, Chaidari, 12462, Athens, Greece

appliedbiomechanics.med.uoa.gr

/appliedbiomechanics

2105832399 & 6938858552

masterbiomechanics.uoa@gmail.com

Introduction

- The National and Kapodistrial University of Athens announces a new 2-year Postgraduate course which leads to a Msc degree in **“Applied Biomechanics and Biomaterials in Orthopaedics”**
- The duration of the Msc is 4 semesters
- The total tuition fees are 4000 Euros, whilst all postgraduate students are enjoying all benefits as per the law
- All modules will be taught in person. There will be a group project in 3rd semester and an individual dissertation in 4rth semester
- Professors from Greek and Worldwide Universities will lecture modules, whereas many workshops and seminars will take place during the course

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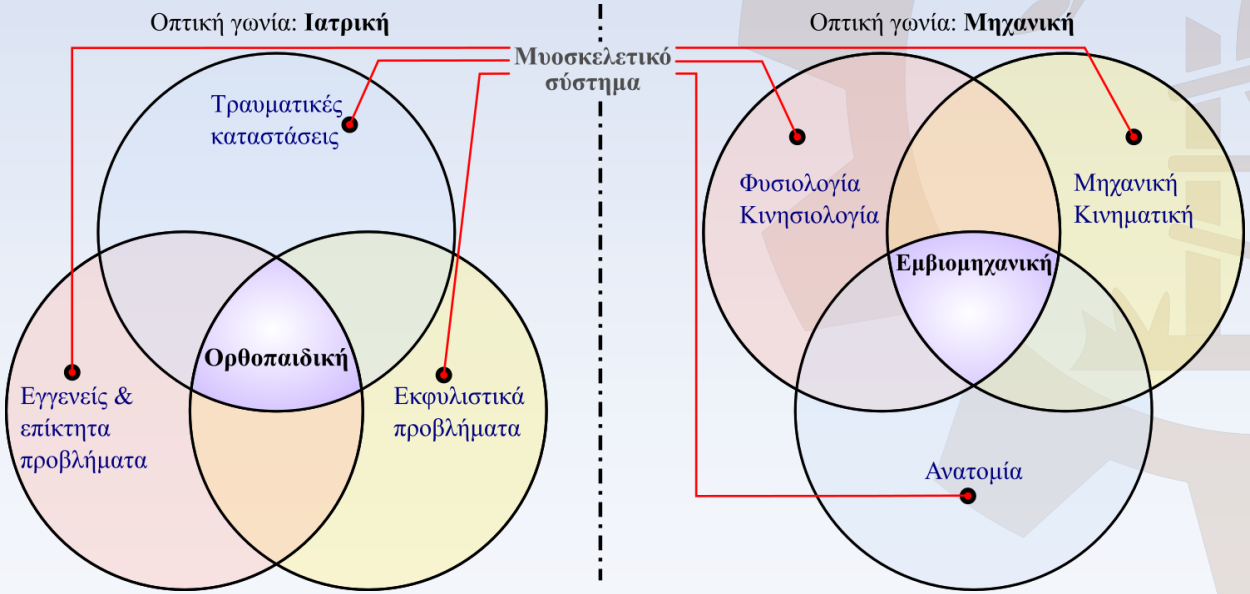
Scope-Why this course?

- During the Msc course, students will study biological organisms (musculoskeletal biomechanics) through an inter-disciplinary approach; from both engineering and medical (clinical orthopaedics) points of view
- Biomechanical studies are:
  - Clinically essential in orthopaedics, especially when it comes to surgical operations where implants and prosthetics are utilised
  - Necessary for engineers looking for specialisation in musculoskeletal and biological analyses, as well as designing of medical, surgical, and orthopaedic products
  - Ideal for scientists and graduates interested in gaining advanced academic and applied background in orthopaedic biomechanics

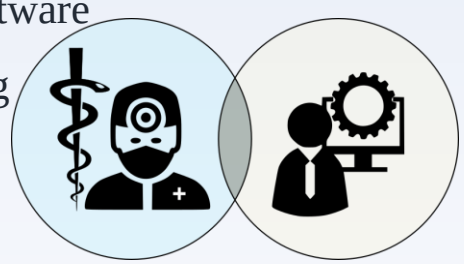


Engineering and Medicine will be bridged thanks to advanced technologies:

- imaging/radiology techniques

-digital design, planning and simulation software

-3d Printing techniques for rapid prototyping



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Why this course?

Granted the successful completion of the Msc course, the Postgraduate students will:

1. Be able to approach with systematic and inter-disciplinary methods any biomechanical problem
2. Gain useful knowledge for a successful academic, clinical or industrial career where advanced biomechanical knowledge is required
3. Gain high-quality theoretical and practical background
4. Know the modern techniques and be familiar with using innovative technologies
5. Know the basics of engineering (for the medical science graduates) and medical science (for the engineering graduates)
6. Be familiar with group projects and working within teams
7. Be specialised in the field that they have chosen as a result of their individual dissertation
8. Gain the required background for PhD studies

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Objectives and Goals

Objectives:

1. Anatomy analysis and operation from micro to macro structure. Mechanical and biological properties of musculoskeletal system
2. Systems modeling, mechanical simulations, fluid mechanics
3. Characteristics of biological and bio-materials, and their manufacturing processes
4. Imaging/radiology techniques and 3D processing of imaging data
5. Orthopaedic principles and biomechanical aspects in surgical and not operations
6. Computer based design of personalised solutions
7. Familiarisation with 3D printing technologies and prototyping anatomical models, implants, prosthetics, instruments
8. Measuring instruments, use of sensors, developing experimental set-ups, data logging and analysis, monitoring systems
9. Innovative technologies: tissue engineering, nano-systems, smart implants
10. Participate in practical applications and biomechanical problem solving
11. Educational visits
12. Emphasis on individual dissertation for optimising the scientific output, group projects, research methodology & paper writing
13. Promoting inter-disciplinary approaches and bridging engineering with medical science
14. Biomimetics:imitating biological systems and applying such principles to non biological systems
15. Gait analysis and athletic biomechanics

Goals: Optimum academic and practical education for the postgraduate students for:

- **Qualitative and quantitative biomechanical analyses**
- **Providing optimum solutions using advanced and innovative technologies**

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Entry requirements

- Medical Science and Engineering based graduates (AEI and TEI) are eligible to apply. Graduates of other fields will also be considered by the board. Non-greek University graduates should provide a certificate from DOATAP

- The following will be considered by the board during the selection process:
  - Personal interview and candidate's motivations
  - Degree and average grade
  - Grades in modules related to the field of biomechanics
  - Knowledge of English language
  - Dissertation theme
  - Published articles in scientific/conference journals
  - Letters of recommendation

- Candidates must provide the following to masterbiomechanics.uoa@gmail.com or physically to the Orthopaedic Research and Education Center "P.N. Soucacos", 1st Department of Orthopaedic Surgery UoA, 1st Floor, Attikon University Hospital , Rimini 1, Chaidari 12462 Athens, Greece:
  - Application form (can be found on appliedbiomechanics.med.uoa.gr or school.med.uoa.gr)
  - Curriculum vitae
  - Certified degree copy and transcript
  - Published scientific/conference articles (optional)
  - Certificates of professional or research activities (optional)
  - ID photocopy
  - Two letters of recommendation
  - Certificate of English knowledge
  - Declaration stating that " It is my understanding that I may be deleted from the course with no financial refund in case I stop my Msc studies without informing the secretary office"

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Course content

1st Semester

-Introduction to Musculoskeletal Biomechancis
-Anatomy and Biomechanics of Musculoskeletal Joints
-Mechanical Analysis of Musculoskeletal Systems & Computational Simulations
-Mechanics of Materials
-Research Methodolody and Scientific Paper Writing

2nd Semester

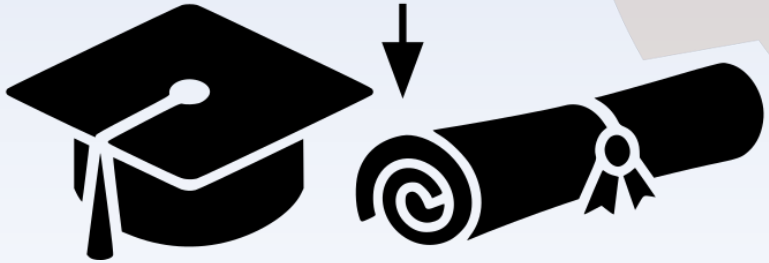
-Orthopaedic Surgery Principles and Personalised Approaches
-Digital Design and Computer-Aided Surgery
-Mechanics of Materials: Fracture criteria
-Bio-materials, manufacturing processes and 3D Printing
-Applications of Biomechanical Analysis: Gait Analysis & Athletic Biomechancis
-Mechatronics

3rd Semester

-Group Project
-Disruptive Technologies in Orthopaedics
-Product Design and Biomimetics
-Innovative Experimental Methods of Bio-materials Evaluation

4th Semester

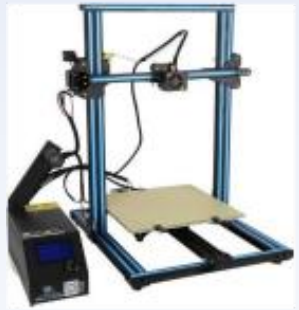
-Individual Dissertation
-Individual Dissertation Support

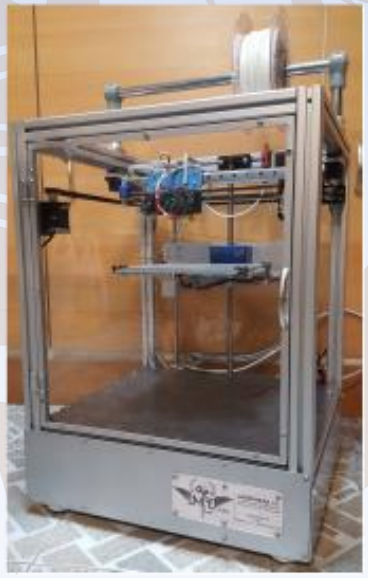


Equipment and facilities

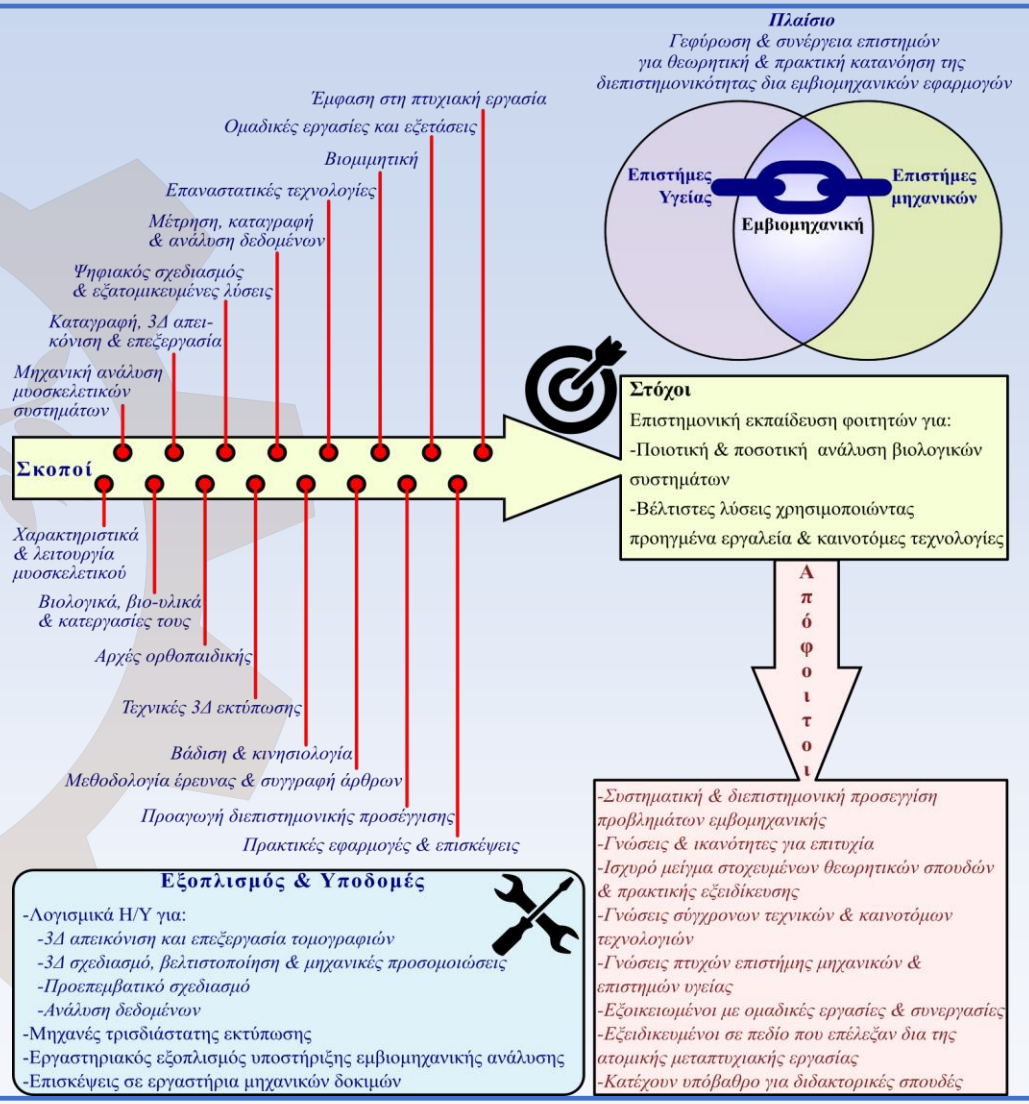
- Lecture halls, laboratories, and libraries in University of Athens, School of Medicine & in National Technical University of Athens will be utilised
- All students will have access to scientific journals and academic databases via the university's network

- **<u>Shown bellow are some 3d printers used in our laboratories and a 3d printed post-resected pelvic anatomy with a sacroiliac prosthesis</u>**




MSc Summary



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