# PhD in Information and Communication Technology for Health

# Università degli Studi di Napoli Federico II

# Module Title: Interaction control in surgical and rehabilitation robotics

# Lecturer: Fanny Ficuciello

## Università di Napoli Federico II

## Dipartimento di Ingegneria Elettrica e Tecnologie dell’Informazione

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## CV (fino a 500 car.): Fanny Ficuciello is Assistant Professor of Control and Robotics at DIETI, UNINA. From 2008 she is Senior Member of the IEEE Robotics and Automation Society. From 2018 she is in the Technology Committee of the European Association of Endoscopic Surgery (EAES). She serves as Associate Editor for Transactions on Robotics (T-Ro). Her research interests include: grasping and manipulation, physical human−robot interaction, impedance control, redundant and cooperative manipulators, medical robotics.

**Nicola Vitiello** received the M.Sc. degree in biomedical engineering (cum laude) from the University of Pisa, Italy, in 2006, and from Scuola Superiore Sant'Anna, Pisa, Italy, in 2007. He also received the Ph.D. degree in biorobotics from the Scuola Superiore Sant'Anna, Pisa, Italy, in 2010. He is currently an Assistant Professor with The BioRobotics Institute, Scuola Superiore Sant'Anna. He is currently the Project Coordinator of: the EU FP7 [CYBERLEGs Project](http://www.cyberlegs.eu/), the IUVO project funded by Fondazione Pisa, and the EARLYREHAB Project funded by Regione Toscana under the Research Program "Salute 2009".

**Dr. Marco Molinari** is the director of Operative Unit A and of the NeuroRobotics Laboratory at the Santa Lucia Foundation. He is an expert in neurological rehabilitation, rehabilitation of spinal cord injuries, strokes and cerebellar pathologies. He also deals with technological applications to rehabilitation with particular experience in robotic rehabilitation and in brain-computer interface systems (BCI). The research focuses on: neurophysiological and cellular mechanisms underlying neurological recovery, neurophysiological and neurobiological bases of neurorehabilitation, neuroscience of rehabilitation, development of innovative technologies in neurorehabilitation, robotic applications in rehabilitation, recovery functional after spinal cord injury and post-stroke rehabilitation.

**Ripetere il campo “Lecturer” per ciascuno dei docenti**

# Dates and Locations (Microsoft Teams)

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| --- | --- | --- | --- |
| Date | Hours | Room | Lecturer |
| 8 febbraio 2021 TBA | 10.30-12.30 | Microsoft Teams | F. Ficuciello |
| 10 febbraio 2021 TBA | 10.30-12.30 |  Microsoft Teams | F. Ficuciello |
| 12 febbraio 2021TBA | 10.30-12.30 | Microsoft Teams | F. Ficuciello |
| 15 febbraio 2021TBA | 10.30-12.30 | Microsoft Teams | F. Ficuciello |
| 17 febbraio 2021TBA | 10.30-12.30 | Microsoft Teams | F. Ficuciello |
| 19 febbraio 2021TBA | 10.30-12.30 | Microsoft Teams | N. Vitiello TBC |
| 22 febbraio 2021TBA | 10.30-12.30 | Microsoft Teams | M. Molinari TBC |

# Content (TBA)

**I Lesson - Introduction** (200-300 car.): Introduction on surgical and rehabilitation robotics

**II Lesson - Rationale** (200-300 car.): Impedance Control and Force Control

**III lesson - Idea** (200-300 car.): Variable Impedance Control

**IV Lesson - Applications** (200-300 car.): Shared Control

**V Lesson - Scope** (200-300 car.): Series Elastic Actuators

**VI Lesson - Conclusions** (200-300 car.): Prof. Nicola Vitiello will illustrate Wearable robotics solutions and exoscheleton

**VII Lesson - Conclusions** (200-300 car.): Dott Marco Molinari will illustrate his research in Neuro-rehabilitation from a clinical point of view

# ECTS Credits: (0.2 per hour of lesson)

# Notes

Doctoral Students are requested to provide a final report on one of the topics of the course illustrating the state of the art, a research proposal that includes the application of a particular tool learned with possible future developments.

Doctoral Students with noticeable experience on this Module topics can participate as Tutors.

Participants to the Module (including those interested to the Tutorship positions) are requested to e-mail to prof. Name of the Professor the following: Student name, name of the PhD course and cycle.

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Info: **Prof. DOCENTE PROPONENTE -** tel. 081 7683916 – fanny.ficuciello@unina.it