



FACOLTA' DI INGEGNERIA DI PISA

ATTIVITA' FORMATIVE A.A. 2023-2024

Laurea Magistrale

BIONICS ENGINEERING

Sezione 1: Manifesto degli studi

| Anno di corso | [SSD] | CFU | | Per | Note | Lab | |
|---|-------------------------|-----|---|-----|------|-----|--|
| Denominazione | | | | | | | |
| Primo anno | | | | | | | |
| Methods and techniques of measurement and data analysis | ING-INF/06 | 6 | | 2 | | | |
| Statistical Signal Processing | ING-INF/03 | 6 | | 1 | | | |
| Bioinspired Computational Methods | ING-INF/05 | 6 | 6 | 1e2 | 1 | | |
| Analysis of bionic and robotic systems | [ING-INF/06,ING-IND/34] | 6 | 6 | 1e2 | 2 | | |
| | | | | | | | |
| Neural Engineering (12CFU) | | | | | | | |
| Applied Brain Science | [INF/01, ING-INF/06] | 6 | 6 | 1e2 | 3 | | |
| | | | | | | | |
| Biorobotics (12 CFU) | | | | | | | |
| Bioinspired and soft robotics | ING-IND/34 | 6 | 6 | 1e2 | 4 | | |
| A scelta dello studente | | 12 | | | | | |
| | | | | | | | |
| Secondo anno | | | | | | | |
| Prova finale | | 15 | | | | | |
| Lab training | | 3 | | | | | |
| | | | | | | | |
| Neural Engineering (42CFU) | | | | | | | |
| Interactive Systems and Affective Computing | [INF/01, ING-INF/06] | 6 | 6 | 1e2 | 5 | | |
| Neural Prostheses | ING-INF/06 | 6 | 6 | 1e2 | 6 | | |
| Integrative Cerebral Function and Image Processing | [MPSI/02,ING-INF/06] | 6 | 6 | 1e2 | 7 | | |
| Bionic Senses | ING-INF/06 | 6 | | 1 | | | |
| | | | | | | | |
| Biorobotics (42 CFU) | | | | | | | |
| Design principles for bionic tissue engineering | ING-INF/06 | 6 | | 1 | | | |
| Wearable robotics | ING-IND/34 | 6 | 6 | 1e2 | 8 | | |
| Rehabilitation and assistive technologies | ING-IND/34 | 6 | 6 | 1e2 | 9 | | |
| Advanced interventional and therapeutic technologies | ING-IND/34 | 6 | 6 | 1e2 | 10 | | |
| | | | | | | | |

| Dettagli insegnamenti integrati (nota INT) | | | | |
|--|--|------------|-----|------|
| Insegnamento Integrato o plurisetoriale | Modulo (solo se integrato) | [SSD] | CFU | Per. |
| 1) Bioinspired Computational Methods | Neural and Fuzzy Computation | ING-INF/05 | 6 | 2 |
| | Biological Data Mining | ING-INF/05 | 6 | 1 |
| 2) Analysis of bionic and robotic systems | Principles of bionics and biorobotics engineering | ING-IND/34 | 6 | 1 |
| | Modeling of multi-physics phenomena | ING-INF/06 | 6 | 2 |
| 3) Applied Brain Science | Behavioural and Cognitive Neuroscience | ING-INF/06 | 6 | 1 |
| | Computational Neuroscience | INF/01 | 6 | 2 |
| 4) Bioinspired and soft robotics | Mechanics of smart materials and structures | ING-IND/34 | 6 | 1 |
| | Soft robotics technologies | ING-IND/34 | 6 | 2 |
| 5) Interactive Systems and Affective Computing | Interactive Systems | INF/01 | 6 | 1 |
| | Affective Computing | ING-INF/06 | 6 | 2 |
| 6) Neural Prostheses | Neural Tissue Engineering | ING-INF/06 | 6 | 1 |
| | Neural Interfaces and Bioelectronic Medicine | ING-INF/06 | 6 | 2 |
| 7) Integrative Cerebral Function and Image Processing | Integrative Cerebral Function | MPSI/02 | 6 | 2 |
| | Advanced Image Processing | ING-INF/06 | 6 | 1 |
| 8) Wearable robotics | Prostheses | ING-IND/34 | 6 | 1 |
| | Exoskeletons | ING-IND/34 | 6 | 2 |
| 9) Rehabilitation and assistive technologies | Biomechanics of human motion | ING-IND/34 | 6 | 1 |
| | Robotic and data-driven rehabilitation | ING-IND/34 | 6 | 2 |
| 10) Advanced interventional and therapeutic technologies | Robotics for minimally invasive and targeted therapy | ING-IND/34 | 6 | 1 |
| | Bionic organs and tissues | ING-IND/34 | 6 | 2 |



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Sezione 2: Dettagli attività a scelta

Insegnamenti dell'Ateneo consigliati come attività a scelta dello studente

| <i>Insegnamento</i> | <i>[SSD]</i> | <i>CFU</i> | <i>Per.</i> | <i>Note</i> |
|---|--------------|------------|-------------|-------------|
| Robot programming frameworks and IoT platforms | ING-IND/34 | 6 | 1 | |
| Electronics for Bionics engineering | ING-INF/01 | 6 | 2 | |
| Advanced materials for bionics | ING-IND/34 | 6 | 1 | |
| Neuromorphic engineering | ING-IND/34 | 6 | 2 | |
| Artificial intelligent systems for human identification | ING-INF/06 | 6 | 2 | |