# Testi del Syllabus

| Resp. Did. | **LONGO RENATA** | **Matricola: 003135** |
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| Docenti | **BATTAGLINI PIERO PAOLO, 3 CFU**<br>**BELGRANO MANUEL GIANVALERIO, 2 CFU**<br>**LEANZA GIAMPIERO, 2 CFU**<br>**LONGO RENATA, 3 CFU** |
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| Anno offerta: | **2016/2017** |
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| Insegnamento: | **895SM - TECNICHE NEUROFUNZIONALI** |
| Corso di studio: | **SM54 - NEUROSCIENZE** |
| Anno regolamento: | **2015** |
| CFU: | **10** |
| Settore: | **FIS/07** |
| Tipo Attività: | **C - Affine/Integrativa** |
| Anno corso: | **2** |
| Periodo: | **Primo Semestre** |
| Sede: | **TRIESTE** |

## 🇮🇹 Testi in italiano

| Lingua insegnamento | English |
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| **Contenuti (Dipl.Sup.)** | Computed Tomography: basic principles, recent techniques and application in brain imaging. Magnetic resonance imaging (MRI): basic principles. Functional MRI: physical and physiological basis. fMRI experimental design: blocks and event relates paradigms data analysis in fMRI: images processing and statistical analysis Exercise in small groups at the MRI unit of the Cattinara hospital: Block design experiments, image acquisition and data analysis. Diffusion weighted images (DWI) and diffusion tensor imaging (DTI): physical basics. DTI in brain imaging: a technique for neurons bundles study Fiber tacking based on DTI data set. Exercise in small groups at the MRI unit of the Cattinara hospital: DTI experiments, image acquisition and data analysis. Introduction to Manganese enhanced MRI. Radioisotopes imaging: single photon emission tomography (SPECT) and positron emission tomography (PET). Physical and physiological basics. Introduction to biological effects of ionizing radiation and radiobiology. The challenge of integration: EEG and MRI or PET, PET and CT or MRI. Introduction to the technical problems and the expected results. The basic aspect of recording and analyse the electrical brain signals with particular enphasys on the basic approaches to build a brain computer interface The course will outline and discuss the making of a scientific publication from the moment an experiment is designed to the time the publication reaches an audience, which must of course be as wide as possible. |
| **Testi di riferimento** | The essential of functional MRI. P. W. Stroman CRC press 2011 Relevant slides and pdf will be provided during classes. |

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| **Obiettivi formativi** | Understanding the physical and physiological basis of the modern techniques used in human brain mapping. To be able of designing and performing an MRI study for brain mapping. The aim of the course is to provide introductory information that should help the participants to improve their skills in manuscript preparation, so as to increase the chance of their papers being accepted by a peer-reviewed international journal. |
| **Metodi didattici** | Lectures and small group tutorials at the MRI unit |
| **Modalità di verifica dell'apprendimento** | oral examination preparation of a short (≈ 200 words) abstract based on a 'blind' manuscript |
| **Programma esteso** | Computed Tomography: basic principles, recent techniques and application in brain imaging. Magnetic resonance imaging (MRI): basic principles. Functional MRI: physical and physiological basis. fMRI experimental design: blocks and event relates paradigms data analysis in fMRI: images processing and statistical analysis Exercise in small groups at the MRI unit of the Cattinara hospital: Block design experiments, image acquisition and data analysis. Diffusion weighted images (DWI) and diffusion tensor imaging (DTI): physical basics. DTI in brain imaging: a technique for neurons bundles study Fiber tacking based on DTI data set. Exercise in small groups at the MRI unit of the Cattinara hospital: DTI experiments, image acquisition and data analysis. Introduction to Manganese enhanced MRI. Radioisotopes imaging: single photon emission tomography (SPECT) and positron emission tomography (PET). Physical and physiological basics. Introduction to biological effects of ionizing radiation and radiobiology. The challenge of integration: EEG and MRI or PET, PET and CT or MRI. Introduction to the technical problems and the expected results. The basic aspect of recording and analyse the electrical brain signals with particular enphasys on the basic approaches to build a brain computer interface The course will outline and discuss the making of a scientific publication from the moment an experiment is designed to the time the publication reaches an audience, which must of course be as wide as possible. |

# 🇬🇧 Testi in inglese

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| **Lingua insegnamento** | English |
| **Contenuti (Dipl.Sup.)** | Computed Tomography: basic principles, recent techniques and application in brain imaging. Magnetic resonance imaging (MRI): basic principles. Functional MRI: physical and physiological basis. fMRI experimental design: blocks and event relates paradigms data analysis in fMRI: images processing and statistical analysis Exercise in small groups at the MRI unit of the Cattinara hospital: Block design experiments, image acquisition and data analysis. Diffusion weighted images (DWI) and diffusion tensor imaging (DTI): physical basics. DTI in brain imaging: a technique for neurons bundles study Fiber tacking based on DTI data set. Exercise in small groups at the MRI unit of the Cattinara hospital: DTI experiments, image acquisition and data analysis. Introduction to Manganese enhanced MRI. Radioisotopes imaging: single photon emission tomography (SPECT) and positron emission tomography (PET). Physical and physiological basics. Introduction to biological effects of ionizing radiation and radiobiology. The challenge of integration: EEG and MRI or PET, PET and CT or MRI. Introduction to the technical problems and the expected results. The basic aspect of recording and analyse the electrical brain signals with particular enphasys on the basic approaches to build a brain computer interface The course will outline and discuss the making of a scientific publication from the moment an experiment is designed to the time the publication reaches an audience, which must of |

course be as wide as possible.

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| **Testi di riferimento** | The essential of functional MRI. P. W. Stroman CRC press 2011 Relevant slides and pdf will be provided during classes. |
| **Obiettivi formativi** | Understanding the physical and physiological basis of the modern techniques used in human brain mapping. To be able of designing and performing an MRI study for brain mapping. The aim of the course is to provide introductory information that should help the participants to improve their skills in manuscript preparation, so as to increase the chance of their papers being accepted by a peer-reviewed international journal. |
| **Metodi didattici** | Lectures and small group tutorials at the MRI unit |
| **Modalità di verifica dell'apprendimento** | oral examination preparation of a short (≈ 200 words) abstract based on a 'blind' manuscript |
| **Programma esteso** | Computed Tomography: basic principles, recent techniques and application in brain imaging. Magnetic resonance imaging (MRI): basic principles. Functional MRI: physical and physiological basis. fMRI experimental design: blocks and event relates paradigms data analysis in fMRI: images processing and statistical analysis Exercise in small groups at the MRI unit of the Cattinara hospital: Block design experiments, image acquisition and data analysis. Diffusion weighted images (DWI) and diffusion tensor imaging (DTI): physical basics. DTI in brain imaging: a technique for neurons bundles study Fiber tacking based on DTI data set. Exercise in small groups at the MRI unit of the Cattinara hospital: DTI experiments, image acquisition and data analysis. Introduction to Manganese enhanced MRI. Radioisotopes imaging: single photon emission tomography (SPECT) and positron emission tomography (PET). Physical and physiological basics. Introduction to biological effects of ionizing radiation and radiobiology. The challenge of integration: EEG and MRI or PET, PET and CT or MRI. Introduction to the technical problems and the expected results. The basic aspect of recording and analyse the electrical brain signals with particular enphasys on the basic approaches to build a brain computer interface. The course will outline and discuss the making of a scientific publication from the moment an experiment is designed to the time the publication reaches an audience, which must of course be as wide as possible. |