

**Doctoral School of the Polytechnic of Bari
(Academic Year 2018/19)**

INSEGNAMENTO	CFU	S.S.D.	DURATA	LINGUA DI EROGAZIONE
The historical research and the study of the Ancient architecture	3	ICAR/18; L-ANT/07	30 ore	INGLESE
L'architettura delle forme strutturali	3	ICAR/12	30 ore	INGLESE
Antenna technology for 5G Communications: propagation, arrays and integration	3	ING-INF/02	30 ore	INGLESE
Green photonics	3	ING-INF/02	30 ore	INGLESE
Blockchain And Distributed Ledger Technologies	3	ING-INF/05	30 ore	INGLESE
Advanced research for microgrids control	3	ING-IND/33	30 ore	INGLESE

1. The historical research and the study of the Ancient architecture

CFU 3 (30 ore); SSD: ICAR/18, L-ANT/07

Ancient architecture is almost always in a state of ruin. His study, aimed at formulation of reliable hypotheses of reconstruction of the building, must be based on integrated survey methodologies that use the detailed analysis of the ancient ruined building as an essential knowledge base. They are taken into consideration therefore, besides to the observations derived from the results of the architectural survey, also any iconographic testimonies from other sources, such as vascular painting, frescoes, bas-reliefs, images on coins, etc. The building and its construction and morphological details, as well as, when present, his architectural sculpture must then be compared with others contemporary architectures, in order to include it in its historical-geographical context. The course therefore aims to present some completed or ongoing architectural research that can effectively illustrating the research method mentioned above. In particular, the following case studies will be addressed

The Arch of Trajan in Leptis Magna

The reconstruction of urban planning of Kos

The Curia in Leptis Magna

Architectural sculpture in the anastylosis of ancient buildings

Urban planning in Ionia and Caria between the archaism and the Hellenistic age

Architectural and decorative models in the mausoleums of the imperial age in Libya

The Hellenistic theater in Mytilene

The townscape in the figurative culture of Greek and Roman times

The urban planning ant the agora of Byllis (Albania)

The Cistern in the agora of Byllis, analysis of the typology and of the constructive aspects.

2. L'architettura delle forme strutturali

CFU 3 (30 ore); SSD: ICAR/12

Il corso si articola in una prima parte in cui sono individuate le Forme della Costruzione, ovvero i principi formali che costituiscono il fondamento delle forme strutturali; quindi la conoscenza degli elementi che le costituiscono ed infine le rispettive regole di composizione. I principi formali si riconoscono essenzialmente nel sistema murario, nel sistema trilitico e nel sistema a traliccio, declinati in differenti possibili variazioni che dipendono dall'uso di materiali e tecniche. Allo stesso tempo si riconoscono altri principi riferiti ai sistemi di copertura: la copertura piana, il tetto, la volta, la cupola.

Il corso si avvia con un breve excursus storico, nel quale si mostrano le origini di tali principi, il loro consolidarsi e svilupparsi attraverso il progressivo potenziamento della tecnica. Particolare attenzione si rivolge alle esperienze del Novecento più significative, quando tali principi assumono una rilevanza decisiva nell'assolvere alle necessità della cosiddetta "architettura delle tecniche", cioè al progetto di grattacieli, fabbriche, edifici commerciali, edifici religiosi, ecc.

Non si trascura la costante riflessione che questo tema ha sviluppato, soprattutto nel Novecento, accompagnando la pratica del progetto. Questo aspetto costituirà la parte teorica dell'intero corso.

3. Antenna technology for 5G Communications: propagation, arrays and integration

CFU 3 (30 ore); SSD: ING-INF/02

-Introduction;

-Antenna elements and types: smart and reconfigurable configurations; -Implementation of antenna arrays using basic principles;

-Characterization and test of antenna and array performance;

-Radiopropagation, beam steering and beam forming for communication systems.

4. Green photonics

CFU 3 (30 ore); SSD: ING-INF/02

Photonics for a sustainable economy – Introduction Sustainable energy generation: nanostructures for photovoltaics. Reduced energy consumption: active photonics devices. Enabled eco-friendly design and production by means of laser technology. Material savings by laser cutting Control of production processes Reduced risk potential by sensor networks Environmental monitoring.

5. Blockchain And Distributed Ledger Technologies

CFU 3 (30 ore); SSD: ING-INF/05

* Blockchain e Distributed Ledger Technologies (DLT): elementi di base, richiami di elementi di reti peer-to-peer e di crittografia, classificazione di piattaforme DLT, ambiti applicativi. [4 ore] *

Strutture dati per DLT: hash tree, Merkle tree. [2 ore] * Algoritmi di consenso per DLT: Byzantine Fault Tolerance, Proof of Work, Proof of Stake, Proof of Authority, Proof of Elapsed Time. [4 ore]

* Smart contract: elementi di base, macchine virtuali distribuite, linguaggi imperativi e dichiarativi per smart contract. [2 ore] * Bitcoin: elementi di base sulle criptovalute, caratteristiche generali della piattaforma Bitcoin, il linguaggio Script, configurazione di un nodo Bitcoin [4 ore] *

Ethereum: Ethereum token, lo standard ERC20; Ethereum come piattaforma per applicazioni distribuite, il linguaggio Solidity. [6 ore] * Hyperledger: architettura della piattaforma; i framework Hyperledger Fabric, Iroha e Sawtooth; tool per l'esplorazione di dati su DLT (Hyperledger Explorer), soluzioni DLT-as-a-Service (Hyperledger Cello); Hyperledger Composer Modeling Language. [8 ore]

6. Advanced research for microgrids control

CFU 3 (30 ore); SSD: ING-IND/33

1. Motivations behind the evolution of distribution networks from passive to active giving rise to the so called "smart-microgrids".
2. Generalities about microgrids, including general structure and different topologies.
3. Analysis of the technologies that should be added to a microgrid to make it smart.
4. Methods and strategies for selecting the most appropriate SCADA system architecture depending on the application. Analysis of the existing SCADA architectures.
5. Analysis of the different operating states of a microgrid and introduction to the main problems related to each of them.
6. Methods and control strategies for ensuring the optimal management and secure operation of these systems in the all possible operating states.
7. Analysis of the main impacts that may be caused by the microgrid control strategies on distribution network operation.
8. Presentation of a real-case