

**Courses/Seminars for PhD students (Electronic
Engineering –open to others) – June and July 2021 (Academic Year 2020/2021)**

General frame

The Courses and Seminars are organized in five tracks:

1. *Communication aspects of R&D (Scientific writing)*
 2. *Organization of R&D (Project Management),*
 3. *Exploitation and Protection of R&D (Patents, spin-off/start-up Companies),*
 4. *Critical Tools (Quality Control, Metrology)*
 5. *Examples of Potential New Frontiers in R&D (quantum computation, epidermal electronics)*
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REMARK - The official language is English and the Lecture Room for all activities is C3, in the “Nuovi Edifici Didattici di Ingegneria”, via del Politecnico, Roma

1. Scientific Writing (32 hours)

Prof. Thomas M. Brown

Schedule : Monday and Wednesday, 09:00 to 13:00, from June 14th to July 7th, 8 days.

Main Topics : Expectations for PhD students, Careers for PhD students in and outside Academia in Engineering and Sciences, Understanding the publication process for peer-reviewed scientific articles: metrics, impact and impact factors, open access, selecting a journal, submission, cover letter, manuscript, peer review, response to reviewers, revisions, editorial processes. Understanding what makes research and your results publishable. Scientific communication: writing, presentations, finding information. Writing of a scientific article (with class exercises): structure of an article (title, abstract, introduction, results, discussion, conclusions etc.), graphing and images, writing a PhD thesis, writing a proceeding, preparing a poster, preparing an abstract for conferences.

*Curriculum Vitae: **Thomas M. Brown** investigated polymer OLEDs for his PhD at the Cavendish Laboratory, University of Cambridge. From 2001– 2005 he developed OTFTs and E-Paper as Senior Engineer with Plastic Logic Ltd. In 2005 he was recipient of a “Re-entry” Fellowship awarded by the Italian Ministry of University and Research and is Associate Professor at the University of Rome-Tor Vergata. Cofounder of the Centre for Hybrid and Organic Solar Energy, his current research is in solution-processed solar cells including perovskites, especially on flexible substrates, and bio-hybrid devices. He is author of over 150 publications and 15 patents and is Associate Editor of Solar Energy.*

2. Project Management (20 hours)

Prof. Vito Introna

Schedule: 14, 16, 21, 22, 23 of June, 14:00 to 18:00

The Project Management course aims at providing students with the basic competencies for managing a project. The course starts with an introduction to Project Management. Then the course focuses on project management processes: initiating processes, planning processes, executing and controlling processes and closing processes. The course focus on processes belonging to different knowledge areas: Scope, Time, Cost, Quality, Resource, Risk, Purchasing, Communication, Stakeholder and Integration. The standard steps and tools needed to implement each processes are described. Finally the course focuses on general management basic competencies and behavioural competencies needed for project manager.

*Curriculum Vitae: **Vito Introna** is Associate Professor at the University of Rome “Tor Vergata” where he teaches “Innovation and Project Management”. He received his PhD in Industrial Product and Process Engineering at the University of Naples “Federico II” in 2003. Since 2000 he has carried out research project for National and International Research Centers and international companies and he has held project management course within Master program and certification program. He is a certified project manager according to the standard UNI 11648:2016.*

3. Exploitation and Protection of Research and Development

3.1 The Opportunities in the EO space sector.

In. Marcello Maranesi

Schedule: 15 of June, 14:00 to 16:00

Content:

- The reference scenario
- The Copernicus Programme
- Opportunities from small satellites
- EO operational applications through AI

*Curriculum Vitae **Marcello Maranesi**: 25 years of International business experience in Earth Observation and Geospatial Information as Director of Telespazio EO Division, CEO of Eurimage for distribution of satellite data of the European Space Agency, and CEO of e-GEOS for the exploitation of Italian COSMO-SkyMed satellite constellation and participation to EU Copernicus Core Services. Now Founder/CEO of GMATICS, a start-up focused on new applications and business models using EO data and Artificial Intelligence*

3.2 The case study of “GEO-K”, a University spin-off for Remote Sensing applications.

Prof. Fabio Del Frate

Schedule: 15 of June, 16:00 to 18:00

Content: Founded in April 2006, GEO-K is the earliest spin-off company from the University of Rome “Tor Vergata”. The mission of GEO-K is to conduct R&D activities and to provide GEO-information consulting, services and products using Knowledge-based techniques in the field of image processing and of microwave, optical and hyperspectral remote sensing.

*Curriculum Vitae: **Fabio Del Frate** is Associate Professor at the University of Rome “Tor Vergata” where he teaches courses of Remote Sensing and Applied Electromagnetism. He is, or has been, principal investigator/project manager in several European Space Agency (ESA) and Italian Space Agency (ASI) funded research projects, author of more than 200 international scientific publications with a special focus on feature extraction algorithms from Earth Observation data using neural networks. He has been a GEO-K co-founder and now he is the President of the company.*

3.3 Design Your Start-Up (8 hours)

Dr. Roberto Giuliani

Schedule: 17 and 18 of June, 09:00 to 13:00

Main Topics

- Introduction: key topics for a start-up
- Design your Business Model Canvas: your company in one slide
- The Business Plan structure and basic instructions about the economic and financial aspects of budgeting for your start-up.
- The start-up fund raising activities addressed to private investors

*Curriculum Vitae: **Roberto Giuliani** (Incubator Manager, BIC Lazio) has over ten years of international experience in marketing and in strategic planning of business. His career started in an American multinational company and today he is responsible for a regional-based structure aimed to support the creation of new companies and spin-off in the high-tech area, with over thirty start-up companies created to date*

3.4 The case study of Radio6ense, The last Metre of the Internet of Things – Seminar, 2 hours

Prof. Gaetano Marrocco

Schedule: 25 of June, 09:00 to 11:00

Content: Radio6ense (R6E) is a spinoff of the Pervasive Electromagnetics Lab at the University of Roma Tor Vergata, founded in 2013 by prof. Gaetano Marrocco and three bright PhD students. The company originated from ten years of pioneering research in the Radiofrequency Identification applied to wireless massive sensing, later on, denoted as the Industrial Internet of Things (I-IoT). Since the beginning, R6E has been supporting big and medium-sized enterprises to develop technology to boost their digital transformation.

During the speech, the founders (prof. G. Marrocco, prof. C. Occhiuzzi, and Dr. S. Amendola) will tell how the company was born, how it approaches customers, how it continuously evolves its business model to fit the market, and will finally describe a typical workflow in a complex I-IoT project

Curriculum Vitae: Gaetano MARROCCO is currently Full Professor of Electromagnetics at the University of Roma Tor Vergata, director of the Medical Engineering Degree and Chair of the Pervasive Electromagnetics Lab. His research is currently focused to the development of the wireless physical layer of the Medical and Industrial Internet of Things. He pioneered the extension of RFID technology to the batteryless sensing of deformation, temperature, humidity, volatile compounds, implanted bio prosthesis, skin parameters, human motion recognition and restoration of epidermal senses.

Associate Editor of IEEE RFID and chair of the Commission D - Electronics and Photonics, Union RadioScience International (URSI) - Italy, Co-founder and President of the University spin-off RADIO6ENSE, active in Industry 4.0.

3.5 Introduction to Patents and related procedures; the role of the IPR consultant

Ing. Antonio Celona

Schedule : 24 of June, 09:00 to 11:00

Curriculum Vitae - Antonio Celona - After graduating in 2001 at the University of Messina in Materials Engineering, he received a Master's Degree in Innovation and Development of Intellectual Property at the Istituto Guglielmo Tagliacarne in Rome in 2003. In 2008 he obtained the qualification as Italian Patent Consultant and he is qualified at the European Union Intellectual Property Office (EUIPO) in the field of designs. In 2012 he obtained the qualification as European Patent Attorney and he is enrolled in the European Patent Institute (EPI).

3.6 Creating value from research: technology transfer and Technology Transfer Office

Dr. Silvia Baiocco

Schedule: 28 of June, 14:00 to 16:00

Curriculum Vitae- Silvia Baiocco (PhD) is a Research Fellow at the Department of Management and Law of the University of Rome "Tor Vergata" with the project entitled "Optimising the university technology transfer offices". She is part of the Operating Committee of the Start Cup Lazio – promoted by the University of Rome "Tor Vergata" together with other Universities and Public Research Organizations located in the Region – that support contestant teams in the drafting of their business plans. She has scientific publications and participates in international conferences on the subject of technology transfer.

3.7 Analysis of a Material Transfer Agreement and the conditions of a license agreement

Dr. Fabiola Massa

Schedule : 30 of June, 14:00 to 16:00

Content: The speech wants to focus the attention on the different provisions that the parties can introduce in a license agreement and on what kind of problems can be derived by them. Furthermore, it will illustrate the usual conditions present in a model of Material Transfer Agreement (MTA).

Curriculum Vitae: Dr. Fabiola Massa is Assistant Professor at "Tor Vergata" University, Department of Management and Law, where she teaches in the area of intellectual property and innovation, with particular attention to biotech and pharmaceutical topics. Dr. Massa is member of the Patent Advisory Committee of the University. She's one of the main experts in the breeder's rights legislation. Her research interests include: Intellectual property rights, trade secret, biotechnology and pharmaceutical inventions, information technology, antitrust law, commercial practices, unfair competition.

4.1- Reliability, Maintainability, Quality control

Francesco Caltagirone, Gabriele Pavan

Schedule : 24 of June, 11:00 to 13:00 and 14:00 to 17:00

Basic elements on Reliability Theory and its applications are given with special attention to Electronics and Telecommunication, Surveillance and Navigation systems and services, and to the criteria to maintain their correct operation during the lifetime. The first part of the talk (G. Pavan) recalls the concepts of Probability on which the Reliability theory and the Quality Control are based, and their fundamentals. The second part (F.Caltagirone) is dedicated to the applications, with attention paid to the system-level Maintenance.

*Curriculum Vitae: **Francesco Caltagirone** received (cum laude) from the University of Rome "La Sapienza" a Master of Science (M.Sc.) in electronic engineering. After 10 years of activity in the Air Defence Radar's field, from nineties was involved for 3 decades in space sciences, satellite's technologies and development of Earth Observation and Universe Exploration infrastructures. Now, retired from the Italian Space Agency, it manages with Italian SME research and development programs in the fields of space technologies, remote earth observation and telecommunications research programs. Moreover and it is involved in teaching and divulgation activities in Radar, Earth Observation and Telecommunication space technology field. He published more than 70 papers on Radar, microwaves, space technologies, remote sensing.)*

*Curriculum Vitae: **Gabriele Pavan***

Gabriele Pavan graduated in Electronic Engineering in 1993 at Tor Vergata University of Rome where in 2000 he received the PhD in Environmental Engineering. Since 2007 he is Assistant Professor (Ricercatore, confermato in 2010), currently working at the Department of Electronic Engineering of the University of Rome Tor Vergata. His research includes : (a) Attenuation compensation technique and rainfall rate estimation, (b) Noise Radar Technology, (c) Analysis of mutual interference among maritime radars. (d) High Resolution Measurements and Characterization Clutter at X-Band and Related Radar Calibration.

4.2-Promises and results in scientific and technological research and development- Parts a and b

4.2.a - Quantum computer and the propagation of fake news in scientific environments

Luigi Accardi

Schedule : 22 of June, 09:00 to 11:00

Content . Imagine a person who becomes famous because the rumor spreads that he has beaten, by a wide margin, the Olympic record of the 200 meters butterfly. He becomes a testimonial and earns a lot with advertising and conferences. Then you learn that the Olympic record with which he is compared refers to the Special Olympics, but he is healthy. What would you think of this? My talk will illustrate this short parable with a case study.

*Curriculum vitae: **Luigi Accardi**, Degree in Mathematics, University of Naples, 1970, PhD (Candidat Nauk), Moscow University, 1974, supervisor I.M. Gelfand. Professor of Probability Theory 1982-2017. Co-founder of the journals: Open Systems and Information Dynamics (1995, still now co-managing editor), Infinite Dimensional Analysis and Quantum Probability (1998, still now in the editorial board).Co-founder, and first director of the "Vito Volterra" interdepartmental Centre.*

4.2.b - Unpromised realizations and unrealized promises

Gaspare Galati

Schedule : 22 of June, 11:00 to 13:00

Content. The apparent paradox of so many – often, very successful - inventions /discoveries never announced nor advertised and , on the other hand, so many a announced but never realized, or never reaching the users/ the market, is exemplified and analysed by retrospective look. Finally, possible reasons are discussed and warning for the future are given.

*Curriculum vitae : **Gaspare GALATI** received the Dr. Ing. Degree (Laurea) in Nuclear Engineering in 1970. From 1970 till 1986 he was with the company Selenia where he was involved in radar systems analysis and design and, from 1984 to 1986, headed the System Analysis Group. From March, 1986 he was associate professor at the Tor Vergata University of Rome, from November 1996 to 2017 he is full professor of Radar Theory and Techniques. In 2017 he has been designated Honorary Professor by the Ministry of Education. His main interests are in Radar theory and techniques, Detection and estimation, Noise Radar, Navigation and Air Traffic Management. He is author/co-author of about 300 papers, 20 patents and 10 books on those topics.*

4.3 Metrology : yesterday, today, tomorrow

Luca Callegaro

Schedule: 1 of July, 09:00 to 13:00

Metrology is the science of measurement, and the International System of units (SI) the basis of modern day measurements. After a short historical introduction, the course will focus on the present SI after its revision, occurred in 2019. In the SI the seven base units are defined in terms of a fundamental constant of nature, which has an exact value. It is now possible to realize the units everywhere and every time, by probing with experiments these fundamental constants. Special attention will be given to the ongoing research towards the realisation of the electrical units volt, ohm and ampere by quantum experiments in solid-state devices, and of the kilogram.

*Curriculum Vitae - **Luca Callegaro** holds a degree in Electronic Engineering (1992) and a Ph. D. in Physics (1996), both from Politecnico di Milano. He joined the Istituto Nazionale di Ricerca Metrologica, INRIM in Torino in 1996. His research interests are focused on electrical impedance; he is responsible of the Italian National standards of electrical impedance, Italian deputy delegate to the European Association of National Metrology Institutes and contact person of its Technical Committee for Electricity and Magnetism. He is author of about 100 papers on international reviews and of the book "Electrical impedance: principles, measurement and applications".*

4.4 On the Design of Complex Systems : from Operational Requirements to Technical Specifications

Andrea Lazzareschi Sergiusti

Schedule : 1st of July, 14:00 to 18:00

Content -The translation of customer requirements into a system able to satisfy the real needs of the operative people is one of the most important tasks of any design effort. This process is very demanding when it is applied to complex system, where many technologies concur to the satisfaction of many requirements. State Laws, company rules, quality standards must be respected and the situation is even harder when requirements, laws and rules change over time and competition is though.

System engineering approach seems the only way to cope with this scenario and the first step is the definition of the Technical Specification of the System. The speech shall develop these concepts using a radar system as a reference. Some of the trends in the electronic market shall also be discussed.

*Curriculum Vitae: **Andrea Lazzareschi Sergiusti** - Ensign In Italian Navy (1977-78), Radar System Engineer at Rehinmetal (Rome, 1979-1982), Head of Avionic Radar Engineering at SMA (Florence, 1983-1991), Head of Radar Engineering at Officine Galileo (Campi Bisenzio, 1992-2000), Engineering Manager and CTO at Galileo Avionica (Campi Bisenzio, 2000-2005), Technical Director and CTO at Galileo Avionica (Italy, 2006-2008), Vice President Integrated Products at Selex-Galileo (2009-2012), Director Cross Division coordination at Selex-ES (2013) , Trento University Consultant (Eledia research Group) (2014-2017).*

Mentor for Startup: Federmanager/APCO (2017-Today), Technical Senior consultant for large Companies and SMEs (2014-Today), Soft Skills and Project Management Teacher in secondary schools and post graduate courses (2014-Today), Radar Technology Teacher in international courses both in Italy and abroad (2016-Today).

5.1. Epidermal Electromagnetics: spreading devices over our skin

Prof. Gaetano Marrocco

Schedule: 8 of July, 09:00 to 11:00

This talk will address the emerging Epidermal or Skin Radioelectronics, a research trend combining multi-disciplinary expertise such as Material Science, Mechanics, Electronics, and Electromagnetics providing further stimuli to the quick-rising "Internet of the Bodies". Starting from the basics of epidermal antennas and their technology and open challenges, the speaker will show some pioneering medium-range digital radio-skins for measurements and transmission of body parameters like temperature, sweat, and respiration rate. Finally, he will introduce the concept of Radiofrequency Finger Augmented Devices (R-FAD) comprising skin sensors for application onto the fingertips and an interconnected on-wrist reading system suitable to artificially replace lost touch senses in impaired people and to provide new bionic capability

5.2. Introduction to Quantum Computation for Engineers

Prof. Aldo Di Carlo

Schedule : 2, 6, 9, 12 and 13 of July, 09:00 to 13:00

Content: *In this course I will review the basic concept of quantum computing and the new paradigm for computation introduced by the quantum mechanical concepts. The concept of qbit is introduced and a short discussion about the quantum algorithm is presented. An overview of present implementation of quantum computers will be given including quantum programming software.*

*Curriculum Vitae - **Aldo Di Carlo** is the director of the Institute for Structure of the Matter of the Italian National Research Council (CNR-ISM) and full professor at the University of Rome "Tor Vergata" (Italy). His research activity focusses on the design, fabrication and characterization of electronic and optoelectronics devices. He was developing a quantum simulation tool based on non-equilibrium transport theory for nanodevices which has been extended to the multiscale simulation software TiberCAD. Recently he was focusing his research investigation on novel nanomaterials including nanotubes, graphene and related 2D materials and halide perovskites. Di Carlo is author/coauthor of more than 450 scientific publications on international journals, 13 patents and several book chapters.*

<u>Week</u>	<u>Monday</u>	<u>Tuesday</u>	<u>Wednesday</u>	<u>Thursday</u>	<u>Friday</u>	<u>Room</u>
	14 June 2021	15 June 2021	16 June 2021	17 June 2021	18 June 2021	
June 14 - 18	T.Brown <i>Scientific Writing</i> (9:30 – 13:00) V.Introna <i>Project Management</i> (14:00 – 18:00)	M. Maranesi <i>The Opportunities in the EO space sector</i> (14:00 – 16:00) F. Del Frate The case study of “GEO-K”, a University spin-off for Remote Sensing applications (16:00 – 18:00)	T.Brown <i>Scientific Writing</i> (9:30 – 13:00) V.Introna <i>Project Management</i> (14:00 – 18:00)	R. Giuliani <i>Design Your Start-Up</i> (9:00 – 13:00)	R. Giuliani <i>Design Your Start-Up</i> (9:00 – 13:00)	C3
	21 June 2021	22 June 2021	23 June 2021	24 June 2021	25 June 2021	
June 21 - 25	T.Brown <i>Scientific Writing</i> (9:30 – 13:00) V.Introna <i>Project Management</i> (14:00 – 18:00)	L. Accardi <i>Quantum computer and the propagation of fake news in scientific environments</i> (9:00 – 11:00) G. Galati <i>Unpromised realizations and unrealized promises</i> (11:00 – 13:00) V.Introna <i>Project Management</i> (14:00 – 18:00)	T.Brown <i>Scientific Writing</i> (9:30 – 13:00) V.Introna <i>Project Management</i> (14:00 – 18:00)	A. Celona <i>Introduction to Patents and related procedures; the role of the IPR consultant</i> (9:00 – 11:00) F. Caltagirone e G. Pavan <i>Reliability, Maintainability, Quality control</i> (11:00 – 13:00) 14:00 – 17:00)	G. Marrocco <i>The case study of Radio6ense, The last meter of the Internet of Things</i> (9:00 – 11:00)	C3
	28 June 2021	29 June 2021	30 June 2021	1 July 2021	2 July 2021	
June 28 – July 2	T.Brown <i>Scientific Writing</i> (9:30 – 13:00) S. Baiocco <i>Creating value from research: technology transfer and TTO</i> (14:00 – 16:00)		T.Brown <i>Scientific Writing</i> (9:30 – 13:00) F. Massa <i>Evolution of the Patent regulations worldwide</i> (14:00 – 16:00)	L. Callegaro <i>Metrology : yesterday, today, tomorrow</i> (9:00 – 13:00) A. Lazzareschi Sergiusti <i>On the Design of Complex Systems : from Operational Requirements to Technical Specifications</i> (14:00 – 18:00)	A. Di Carlo <i>Introduction to Quantum Computation for Engineers</i> (9:00 – 13:00)	C3
	5 July 2021	6 July 2021	7 July 2021	8 July 2021	9 July 2021	
July 5 - 9	T.Brown <i>Scientific Writing</i> (9:30 – 13:00)	A. Di Carlo <i>Introduction to Quantum Computation for Engineers</i> (9:30 – 13:00)	T.Brown <i>Scientific Writing</i> (9:30 – 13:00)	G. Marrocco <i>Epidermal Electromagnetics: spreading devices over our skins</i> (9:00 – 11:00)	A. Di Carlo <i>Introduction to Quantum Computation for Engineers</i> (9:30 – 13:00)	C3
July 12 - 16	12 July 2021 A. Di Carlo <i>Introduction to Quantum Computation for Engineers</i> (9:30 – 13:00)	13 July 2021 A. Di Carlo <i>Introduction to Quantum Computation for Engineers</i> (9:30 – 13:00)	14 July 2021	15 July 2021	16 July 2021	C3