

PEoPLe@DEIB

HARD SKILLS Courses

The unstoppable evolution of technology and the parallel innovation of jobs are generating the request from industry of new professional profiles that go beyond their specialized competences ("hard skills"). To address this need, new teaching methods are being introduced in academic education for stimulating learning based on passion and individual attitudes. The goal is that of privileging flexible and multidisciplinary approaches, with particular attention to project based methodologies.

This proposal of innovative teaching wants to follow this international trend and proposes a set of extra-curricular courses/activities that, based on the competences acquired in the regular courses, allow the student to experiment new ways of learning through the interaction with instructors, companies, as well as with national and international organizations.

In particular, the proposal includes courses oriented to:

- Acquire competences on general purpose tools and methodologies
- Multidisciplinary and project oriented activities
- Company driven activities, team work, direct interaction with other students (workshops, contests, hackathons).

Courses Calendar

Course	Scheduling	October	November	December	January	February	March	April	May	June	July
Supporting Justice with Engineering Methods	Mon.-Fri. 17:30-20:00		20 - 30	1 - 4				2 - 16			
DisSfida	Mon.-Fri. 17:30-20:00										
Model based design	Thursday, 17:30-20:00				18, 25	1, 8, 15, 22	3				
Puzzle based learning	Mon.-Fri. 17:30-20:00							2nd semester			
Embedded systems: control, implementation, security	Mon.-Fri. 17:30-20:00					27	1,6,8,13,15,20,22,27	5,1	22,24,29,31		
Good Measurements for Good Decisions	Mon.-Fri. 17:30-20:00		20 - 30	1 - 15					2 - 25		
Learn Your Way	Mon.-Fri. 17:30-20:00										
Electronics Contesting	Mon.-Fri. 17:30-20:00		First Lesson 30								
Electronics for Sound and Music	Mon.-Fri. 17:30-20:00										
Team 4 iGEM	Mon.-Fri. 17:30-19:30							9, 10, 23, 24, 26	2,3,8,9,10,15,16,17		
"Crash" course in data science	Mon.-Fri. 17:30-20:00					12 - 23					
Interactive Internet of Things e Smart Object Design	Sat. 9:00-18:00							14			
Innovative CircuitLab	Mon.-Fri. 17:30-20:00										
Student Design Competition Inter. Microwave Symp.	Mon.-Fri. 17:30-20:00										
Robotic Toys for Children with Disabilities	Mon.-Fri. 17:30-20:00						1 - 30	1 - 9			
Robotic Emotions	Mon.-Fri. 17:30-20:00							15 - 30	1 - 20		
Introduction to Python Programming	Mon.-Fri. 17:30-19:30				9 - 18						
Machine Learning for geo-physical data interpretation	Mon.-Fri. 17:30-20:00							2nd semester			
XOHW PoliMi BOOTCAMP	Mon.-Fri. 17:30-20:00, Sat./Sun. 24h		29 - 30	4-5, 11-12, 14, 18, 20	11, 18, 25	1, 8, 15, 22					
High-Speed Signal Integrity	Mon.-Fri. 17:30-20:00							2nd semester			
Creative Computing for Artistic Performances	Mon.-Fri. 17:30-20:00, Sat. 24h							2nd semester			
Sport and Wellness Hackathon Bootcamp @NECSTLab	Mon.-Fri. 17:30-20:00, Sat./Sun. 24h		16, 24	1,6,13,15,20,15,17,19	5,12,19						

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1. SUPPORTING JUSTICE WITH ENGINEERING METHODS

OBJECTIVES

This course is aimed at:

- Explain the role of technical expertise and technical experts in legal proceedings;
- Explain the correct way with which the results of technical expertise shall be exposed, especially when they involve experimental results;
- Explain the typical issues of forensic informatics.

ABSTRACT

Technical issues have been playing a relevant role in forensic practice and represent an important aid to those who administer Justice. The typical methods of engineering represent a large part of the forensic sciences and this course aims at providing a brief survey of these methods.

After an introduction on legal proceedings and the role played by the technical experts, the important issue of the validation of the experimental data will be covered under different points of view. The impact of approximations and measurement errors will be first analyzed, followed by the metrological methods that must be adopted to provide correct scientific evaluations in the technical expertise. Finally, the typical problems of forensic informatics will be covered, ranging from data interpretation to the reliable definition of timestamps and repeatability of operations.

COURSE DETAILS

Activity type: **Lectures e Laboratory**

Duration: **18 hours**

Max number of students: **60**

Teaching staff: **Alessandro Ferrero, Veronica Scotti, Stefano Zanero**

Delivery Dates: **20 November 2017 (I semester).**
2 April 2018 (II semester).

Contacts and information: **Prof. Alessandro Ferrero**

Teaching language: **Italian/English**

Delivery mode and repetition: **Biannual (each one in semester).**

Registration

20 November: <https://tinyurl.com/PeoPLe-DEIB-Ing-giustizia>

2 April: <https://tinyurl.com/PeoPLe-DEIB-Ing-giustizia-apr>

2. DisSfida

OBJECTIVES

Students learn by experiencing in practice, giving a real value to their competencies and to the knowledge gained during University studies. In addition, they contextualize their work with soft skills such as: Team working, Public speaking and presentation, Feasibility study and interactive design, Timing and project management.

ABSTRACT

Politecnico students at the service of non-profit Institutions/social inclusion of disabled subjects. Breakdown of activities:

- Call for project ideas to non-profit Institutions (patient associations, foundations, ...)
- Each Institution suggests a project case.
- A coordinating committee discusses the proposals and configures the projects so to comply with the challenge timing and to the Institutions' expectations.
- The coordinating committee identifies the competencies or skills needed for each project, which should be supplied by the student teams; each project is assigned to one/two tutors (e.g. PhD or PostDoc).
- Project list published, along with requested team characteristics; starting event.
- Students gather in teams, each team applying for one project: maximum three competing teams (one tutor per team)
- One-month team work with tutor and teacher; soft-skill tutors available, if possible. No seminars given. One 1-hr meeting per week, each team.
- Final event with project presentation to stakeholders (no-profit Institutions) and possible funders from the industrial field.
- Each winning project gets a token award. Possible collateral awards. Mention in the Diploma Supplement.

Projects do not involve scientific research, but applications, each one possibly leading to a well-contextualized feasibility study, or a mock-up, or a product, for simple themes. Associations may benefit by getting realistic project ideas, connecting with highly-motivated students and with Academic staff having relevant competencies in their respective fields.

COURSE DETAILS

Activity type: **Competition**

Duration: **18 hours (Presentation: 4 hours, Projects: 5 hours, Final event: 8 hours)**

Max number of students: **60**

Teaching staff: **Alessandra Pedrocchi, Beniamino Fihours, Maria Gabriella Signorini**

Delivery Dates: **February 2018 – March 2018 (II semester).**

Contacts and information: **Prof. Alessandra Pedrocchi**

Teaching language: **Italian/English**

Delivery mode and repetition: **once per year.**

Registration: <https://tinyurl.com/PeoPLe-DEIB-DisSfida>

3. MODEL BASED DESIGN: From the software model to microprocessor based implementation of physical models.

OBJECTIVES

The main goal of this course is enabling our students to an efficient use of Simulink and Stateflow to model electrical/electronic systems including their control components aimed at a variety of applications. The algorithms and systems will be encoded using automated code generation tools and implemented on system development hardware.

ABSTRACT

The course is based on a first lecture based "Getting Started" phase, followed by lab workgroups on specific problems proposed to the students and, finally, the physical implementation of a project requiring system modelling, code generation and hardware prototyping on system development boards.

COURSE DETAILS

Activity type: **Lectures e Laboratory.**

Duration: **30 hours (Getting started: 8 hours, Laboratory: 22 hours)**

Max number of students: **40**

Teaching staff: **Giambattista Gruosso, Luca Bascetta, Giancarlo Storti Gajani, studente 150 hours**

Delivery Dates:

First Semester:

18 January,

25 January,

1 February,

8 February,

15 February

22 February,

3 March

Second semester: **May 2018 – June 2018 (II semester).**

Contacts and information: **Prof. Giambattista Gruosso**

Teaching language: **Italian/English**

Delivery mode and repetition: **biannual (twice per year, once each semester).**

Target students: **Elettrici, Elettronici, Automatici, Telecomunicazionisti, Bioingegneri, Informatici, Meccanici.**

Required equipment: **Matlab & Simulink, hardware (Microprocessor systems based on ARM: Rabsperry PI, STM32).**

Registration

Primo semester: <https://tinyurl.com/PeoPLe-DEIB-Modelbaseddes-1sem>

Secondo semester: <https://tinyurl.com/PeoPLe-DEIB-Modelbaseddes-2sem>

4. PUZZLE BASED LEARNING

OBJECTIVES

The main objective is to get involved in the problem solving and to tackle new problems making use of intuition and creativity. This is the usual setting that can arise in the real life working environment or during job interviews. The other objectives are to stimulate the learning by doing and collaborative learning approaches.

ABSTRACT

The Puzzle-based learning is a teaching approach aiming at the improvement of reasoning skills, persistency and motivation in tackling problems. These skills are at the base of problem solving. The problems that are proposed are games that do not require particular knowledge nor solution techniques and have the unique intent of being challenging and intriguing. The teacher has the role of guiding the learning process but does not add anything to the discovery that must be carried out by the students that are the real main actors of the learning process. The role of the teacher is that of a sport coach, whose motivation skills are more important than the technical ones.

The course will be adapted in the contents and in the duration depending on the interests of the participants. The games considered in the course will include topology, probability, logic, geometry and optimization. The classes will be based on laboratorial activities, experiments, team works and collective discussions.

A final orienteering competition inside the campus will conclude the course.

COURSE DETAILS

Activity type: **Lectures e Competition (eventual).**

Duration: **20 hours**

Max number of students: **60**

Teaching staff: **Federico Malucelli**

Delivery Dates: **March 2018 – June 2018 (II semester).**

Contacts and information: **Prof. Federico Malucelli**

Teaching language: **Italian/English**

Delivery mode and repetition: **once per year.**

Target students: **All Master Degree Programs (including architecture and design).**

Registration: <https://tinyurl.com/PeoPLe-DEIB-PuzzleBasedLear>

5. EMBEDDED SYSTEMS: CONTROL, IMPLEMENTATION AND SECURITY

ABSTRACT

Embedded systems are pervasive in our everyday life, and are now commonly referred to as cyber-physical systems, in that they combine digital and physical features. Examples of such systems are all the products that are endowed with automatic features, implemented on board of such objects, that determine all or part of their functionalities. To be able to design and realize such systems, one must master three main abilities: control theory, embedded software coding, and analysis of the related security threats, possibly proposing countermeasures to them. This creative project is thought to offer students a coordinated and integrated overview of these three aspects, and to apply them to a practical problem from different application domains. The activities will be supported by the use of appropriate tools, so that also practical skills are developed within the course.

The course will start with approximately 8 hours of class lessons for each discipline (control, implementation and security) which focus on specific aspects of embedded systems design. Then, a project will be assigned to small groups (2 to 4) of students. Students can also propose a project of interest. The work on the project will be mostly autonomous, with scheduled intermediate meetings with the instructors to discuss specific problems. At the end of the course each group will give a final presentation presenting the project results to the whole class.

COURSE DETAILS

Activity type: **Lectures e Laboratory (Creative Project).**

Duration: **50 hours**

Scheduling:

Lectures:

TUE 27/2 - 17.15-19.15

THU 1/3 - 17.15-19.15

TUE 6/3 - 17.15-19.15

THU 8/3 - 17.15-19.15

TUE 13/3 - 17.15-19.15

THU 15/3 - 17.15-19.15

TUE 20/3 - 17.15-19.15

THU 22/3 - 17.15-19.15

TUE 27/3 - 17.15-19.15

THU 5/4 - 17.15-19.15

Project Presentations

TUE 10/4 17.15-19.15, 8 ore a fine corso per la presentazione dei risultati (15 minuti a progetto)

TUE 22/5 - 17.15-19.15

THU 24/5 - 17.15-19.15

TUE 29/5 - 17.15-19.15

THU 31/5 - 17.15-19.15

Max number of students: **80**

Teaching staff: **Mara Tanelli, Marco Santambrogio, Stefano Zanero**

Delivery Dates: **March 2018 - May 2018 (II semester)**

Contacts and information: **Prof.ssa Mara Tanelli**

Teaching language: **English**

Delivery mode and repetition: **once per year.**

Registration: <https://tinyurl.com/PeoPLe-DEIB-EmbeddedSystems>

6. GOOD MEASUREMENTS FOR GOOD DECISIONS: A CORRECT INTERPRETATION OF THE INFORMATION FROM INSTRUMENTS AND LABORATORIES

ABSTRACT

Experimental activities are an important part of any engineer profession. The results coming from this experimental activities, first of all the measurement results, are never totally correct, since a lot of factors may influence their accuracy. Therefore, aim of the course is to show the students the problems which are at the basis of achieving good experimental data and use correctly the experimental data and laboratories. A good knowledge of these problems are very important to correctly use the information coming from in-field experimental activities.

The course proposes a general overview on the theory of measurements and the characterization of the experimental data to guarantee their reliability. Then, different applications are considered in different labs at Politecnico, in different applications: industrial, electronic, biomedical and environmental. In particular:

1. Micro and Biofluid Dynamics Laboratory (μ BS Lab): Execution of measurements in cardiovascular fluid dynamic mockups: flowrate and pressure measurements with water-based fluids. Measurements of the rheologic features of the fluids employed: kinematic viscosity and volumic mass.
2. "Electric Measurements" lab (didactic laboratory – Building 7): calibration of a DC voltage power supply, having a 4 digit display, with a multimeter having a 5 ½ digit display, and uncertainty evaluation. Students will learn how measurements have to be correctly made, how the instrument resolution have to be taken into account and how the measurement data must be elaborated to evaluate the measurement uncertainty.
3. "Optical Measurements of displacements" lab (S11 - Laboratorio di misure ottiche): Displacements and vibrations measurement through a self-mixing interferometer, realized by a simple red laser. Students will acquire interferometric signals and develop custom signal processing for measuring displacements, both in time and in frequency domain. Through the practical application, students will better understand the meaning of spectrum, noise, disturbances and signal fading.
4. "Robotics" Laboratory (MERLIN laboratory): students will first analyze what one can measure in a traditional robotic cell (forces, positions, distances, quality, number of available workpieces, etc.) and in a collaborative one (position of one or mhours body parts of the operator, etc.). Then, the class will try to discuss and propose how a certain measurement can be used to enhance the efficiency of one or mhours processes (assembly, machining, etc.).

"Environmental" lab: to be defined, at Envlab laboratory. This lab will be available since 2018.

COURSE DETAILS

Type of activities: **Frontal lessons and laboratories.**

One introductive thehourstical lesson: 5 hours

5 laboratories: 5 hours each, not overlapped

Duration: **30 hours**

Max number of participants: **20**

Professors: **Simona Salicone, Renato Casagrandi, Alessandro Ferrero, Gianfranco Beniamino Fihours, Michele Norgia, Andrea Zanchettin**

The course will be repeated twice a year.

Time schedule: **I semester: November 20, 2017 - December 15, 2017**

II semester: May 2, 2018 - May 25, 2018

Contact and information: **Prof. Simona Salicone**

Language: **Italian/English**

REGISTRATION

Primo Semester: <https://tinyurl.com/PeoPLe-DEIB-MisurareXDec-1Sem>

Secondo semester: <https://tinyurl.com/PeoPLe-DEIB-MisurareXDec-2Sem>

7. LEARN YOUR WAY: MACHINE LEARNING FOR NAVIGATION

ABSTRACT

In this activity, students will learn, evaluate and test machine learning algorithms tailored to localisation problems using wireless networks, with particular focus on navigation in indoor and outdoor scenarios. The activity is structured in two parts, a first theoretical part followed by a practical one in form of a competition.

In the theoretical part, lectures will be given in order to present fundamental concepts on localisation using radio technologies. Machine learning algorithms and a brief background on Matlab programming will be also presented.

In the second part, students will apply the techniques learnt during the theoretical lectures on a training dataset containing radio measurements obtained in indoor/outdoor scenarios. Students will be organised in teams and will use the training dataset to create localisation algorithm that will be later tested on a test set of data. The team who obtains the best localisation accuracy wins the competition. Additionally, students may participate (on a voluntary basis) to the collection of additional measurements in order to increase the available data sets through a smartphone application.

COURSE DETAILS

Activity type: **Lectures, Laboratory e Competition**

Duration: **10 hours**

Max number of students: **80**

Teaching staff: **Alessandro Redondi, Monica Nicoli, Matteo Cesana**

Delivery Dates: **March 2018 – June 2018 (II semester).**

Contacts and information: **Prof. Alessandro Redondi**

Teaching language: **Italian/English**

Delivery mode and repetition: **once per year.**

Registration: <https://tinyurl.com/PeoPLe-DEIB-LearnYourWay>

8. TEAM 4 iGEM

OBJECTIVES

Project Planning and Administration, Team and Resource Organization, Collaborative Teamwork, International Workplace Environment, Entrepreneurship, Labor Safety, Ethical Aspects in Science and Engineering, Scientific Communication, Communication Skills

ABSTRACT

The International Genetically Engineered Machine (iGEM) is a non-profit independent organization whose aim is the education and dissemination of "Synthetic Biology" and the organization of a well-known international university competition on the subject. "Synthetic Biology" is a relatively recent discipline in which the application of engineering concepts is extended to genetic engineering with the aim of simplifying the design and implementation of biological systems for the development of new biotechnologies.

Basically, iGEM is a didactic tool that is used for laboratory activities by assigning projects to be carried out after acquiring the basic principles of synthetic biology. The iGEM (iGEM Jamboree) competition is a worldwide event that takes place annually, with around 250 teams from around the world. Multidisciplinary teams work to build genetically engineered systems using and creating standard biological parts called BioBricks, and implementing their project on well-known and studied bacteria E coli, easy to manipulate with standard laboratory protocols and requiring the minimum level of laboratory safety. Teams are evaluated in the competition based on their contacts with local reality (e.g., museum presentations, temporary college kiosks), during which they have to educate the community on synthetic biology and gather public impressions. Each team must be also engaged in social networks and promote their own project.

The purpose of the proposal is to prepare a team to participate in iGEM. The goal is to select a team of heterogeneous students who, supported by the instructors, will

1. Have a good idea for a biological program
2. Design the genetic code through:
 - a. use of already written parts (BioBricks);
 - b. write your own code
3. Enter the code into E coli bacteria and test them
4. Document the project in a public Wiki
5. Send the program using a special DNA packing
6. Participate in the competition

In order to provide the team with the necessary skills on the basic techniques to achieve nano biological devices, it will be necessary to provide courses on synthetic biology, molecular, chemical and laboratory safety.

COURSE DETAILS

Activity type: **Lectures, Laboratory, Competition**

Duration: **30 hours**

Max number of students: **20**

Teaching staff: **Maurizio Magarini, Emilio Parisini (IIT, Italian Institute of Technology)**

Delivery Dates: **9, 10, 23, 24, 26 April 2018 – 2,3,8,9,10,15,16,17 May 2018.**

Contacts and information: **Prof. Maurizio Magarini**

Teaching language: **Italian/English**

Delivery mode and repetition: **once per year.**

Target students: **informatica, chimica, telecomunicazioni, elettronica, elettrotecnica, automazione e bioingegneria**

Registration

<https://tinyurl.com/peoPLe-DEIB-TEAM4iGEM>

9. INTERACTIVE INTERNET OF THINGS AND SMART OBJECT DESIGN

ABSTRACT

This course is for students of "Computer Science and Engineering" (I and II level), "Communication Design" (II level), and possibly - based on availability, for students of other degree programs who would be interested in i) deepening and experimenting technologies for Interactive Internet of Things and ii) engaging themselves in the design of smart objects (i.e., physical devices equipped with sensors and/or actuators, that can support different interaction modalities based on manipulation, gestures, voice).

This course will principally consist in demos and hands-on sessions for the design and prototyping of smart objects. Students will be required to design a smart-object prototype related to a topic with a social impact, such as environmental sustainability, educational and social services (i.e., related to social exclusion and disadvantaged backgrounds, and to assistive technology for frail people such as individuals with intellectual disabilities).

The lecturers of the course have gained several results from research and development experiences, and they also have a large joint-teaching experience. Therefore they will be able to provide students with high-quality material, a large body of examples, and design suggestions that will be useful as starting points for the students' activity. The course idea indeed originates from project-oriented, multidisciplinary teaching experiences that the teachers have been conducting for some years in the Computer Engineering ("Advanced User Interfaces" course), Communication Design ("Interaction Design Studio" course) and Product Design ("Meta-Progetto" studio) degree programmes. The teachers are also involved in several active research collaborations between the 3I and the Design schools that have also led to the establishment of two research laboratories (Polifactory and ED-ME).

Some experts coming from companies operating in the Design and IoT sectors will be also involved.

COURSE DETAILS

Activity type: **Lectures**

Duration: **10 hours**

Max number of students: **60**

Teaching staff: **Franca Garzotto (DEIB), Maristella Matera (DEIB), Vittorio Zaccaria (DEIB), Venanzio Arquilla (Dipartimento di Design)**

Delivery Dates: **14 April 2018**

Contacts and information: **Prof. Franca Garzotto**

Teaching language: **Italian/English**

Delivery mode and repetition: **once per year.**

Target students: **All Master Degree Programs, but with special focus for computer science students and communication design.**

Registration:

<https://tinyurl.com/PeoPLe-DEIB-SmartObjectDesign>

10. INNOVATIVE CIRCUITLAB

OBJECTIVES

The main objective of the course is to introduce the student to the (proficient) use of circuit simulators for the analysis of electrical/electronic systems and to the basic circuit design and implementation workflow, using as case studies simple circuits and simulators as main design support tool. The students will also be involved in basic laboratory activity and get acquainted with basic discrete components, development boards and laboratory instruments.

DESCRIZIONE

Innovative CircuitLab is dedicated to all students wishing to have an in depth contact with electrical circuit analysis and design. The main topics concerning circuit simulation methods and techniques will be discussed, considering, specifically, circuits that have impact in everyday life. Circuit simulation will be followed by a circuit implementation and testing phase, so that a "full" and "tangible" experience is guaranteed. The students will become acquainted with real components, their connections, standard laboratory equipment and measurement instruments and will have a chance to verify all main circuit laws in the field. The students will have the opportunity to organize themselves in groups, so that each student will be allowed to focus its activity on its preferred interest or point of view in relation to the group's project. Student groups will share experiences with their peers by autonomously organizing demo sessions and presentations (lab in the lab) offered to the class.

COURSE DETAILS

Activity type: **Laboratory**

Duration: **20 hours**

Max number of students: **30**

Teaching staff: **Giambattista Gruosso, Angelo Brambilla, Federico Bizzarri, Lhoursnzo Codecasa, Dario D'amhours, Paolo Maffezzoni, Sergio Pignari, Giancarlo Storti Gajani, External Professor**

Delivery Dates: **February 2018 (I semester).**

April 2018 (II semester).

Contatti: **Prof. Giambattista Gruosso, Prof. Federico Bizzarri**

Teaching language: **Italian/English (on demand)**

Delivery mode and repetition: **Biannual (each one in semester).**

Registration:

Primo Semester: <https://tinyurl.com/PeoPLe-DEIB-InnovCircuitLabFeb>

Secondo Semester: <https://tinyurl.com/PeoPLe-DEIB-InnovCircuitLabMay>

11. STUDENT DESIGN COMPETITION AT THE INTERNATIONAL MICROWAVE SYMPOSIUM

OBJECTIVES

Complete design planning of a circuit (active or passive) operating at RF/Microwave frequencies, from the synthesis to the fabrication. Submission of the design to an international competition. Improve the skill to present and promote the developed work

ABSTRACT

This activity is aimed to form one or more teams of four students (from the Courses involved in this proposal) willing to submit a circuit design to the "Student Design Competition". This competition is held every year during the International Microwave Symposium (IMS) in USA, which is the most important conference in the field of microwave circuits and applications. Every year, at the end of September, the Organizing Committee of IMS proposes several design contests regarding both active and passive microwave circuits, among which each team chooses one to submit. The design is then carried out, starting with the synthesis of the circuit (using the available CAD tools at Politecnico di Milano) up to the fabrication of the circuit and its verification. Among all the submitted designs, the Organizing Committee selects the finalists that will present their work at the IMS in June. Finally, a jury will choose the winner of the Competition (the winner team is awarded with a cash prize). One component of the teams formed at Politecnico that have been selected as finalists will participate at the IMS.

COURSE DETAILS

Activity type: **Laboratory**

Duration: **30 hours**

Max number of students: **20**

Teaching staff: **Giuseppe Macchiarella, Guido Genitli, Marco Politi, Salvatore Levantino**

Delivery Dates: **January 2018 - March 2018.**

Contacts and information: **Prof. Giuseppe Macchiarella,**

Teaching language: **English**

Delivery mode and repetition: **once per year.**

Registration:

<https://tinyurl.com/peoPL-DEIB-InternMicrowaveSym>

12. ROBOTIC TOYS FOR CHILDREN WITH DISABILITIES

ABSTRACT

Children affected by different kind of disabilities may experience difficulties in playing alone or with other children, either affected by disability or normally developed. We propose a competition to implement small robots that could be used by such kind of children to play, using tools and materials provided by this course. The competition lasts 5 weeks and each group should produce a working object that could be evaluated by real users, in safe conditions. It is possible to use technologies including microcontrollers like Arduino or ESP32, phone or tablet apps, sensors and actuators.

This activity is aimed at providing the possibility to learn how to work in a practical and effective way with sensors, actuators and microprocessors to achieve a well-defined goal, with some social utility. The learning process is constructivist (Papert), based on learning by doing. Students should already be able to program in the language used for the application. They will receive an introduction of 2 hours about the use of sensors and actuators, one hour about the design of mobile objects, and one hour about the disability problems they could face. Then they will be free to form groups to work, consisting of at most 4 people. During the whole activity, the students will be supported by the Artificial Intelligence and Robotics Lab (AIRLab), where a tutor will be available in given hours, and experts will be available.

On the final event day, the produced robots will be tested with people with disabilities hosted by a partner association. A panel of experts will evaluate the quality of the product for its technical (50%) and application (50%) aspects.

SCHEDA CORSO

Activity: **frontal teaching, self-managed lab, competition**

Duration: **45 hours**

Max participants: **30**

Teachers: **Andrea Bonarini, student 150 hours, external expert on disability**

Date di erogazione: **March 1st 2018 – Aprile 9th 2018 (II semester).**

Contacts: **Prof. Andrea Bonarini**

Language: **Italian/English**

Kind of offer and repetition: **Frontal lesson (4 hours), supported lab. Once a semester**

Enrollment:

<https://tinyurl.com/PeoPLe-DEIB-robotBambiniDisab>

13. ROBOTIC EMOTIONS

ABSTRACT

How is it possible to render emotions using motors, lights and sounds? This lab, introduced by four hours of lessons about sensors, actuators and emotional expression, gives the possibility to explore how to design and actually build objects that could show a simple social relation with people. Goal of this lab is to work "hands-on" with sensors, actuators, and microprocessors like Arduino and ESP 32 to achieve a defined goal. In this first edition, the goal will be to produce mobile objects to be placed on the side of the DEIB Building 20 entrance, able to show emotional interaction with people entering the building. These objects should be implemented in the available time (5 weeks) and with material already available for the lab, or that could be obtained in this time. On the final day event, the robots will be put in place at the DEIB entrance, and tested. A panel of teachers and users will evaluate the proposals from the technical (50%) and applicative (50%) points of view. The winner(s) could stay on operation for a given period.

The learning process is constructivist (Papert), based on learning by doing. Students should already be able to program in the language used for the application. They could organize themselves in groups, consisting of at most 4 people. During the whole activity, the students will be supported by the Artificial Intelligence and Robotics Lab (AIRLab), where a tutor will be available in given hours, and experts will be available.

SCHEDA CORSO

Activity: **frontal teaching, self-managed lab, competition**

Duration: **45 hours**

Max participants: **30**

Teachers: **Andrea Bonarini, student 150 hours, external expert**

Date di erogazione: **April 15th 2018 – May 20th 2018 (II semester).**

Contacts: **Prof. Andrea Bonarini**

Language: **Italian/English**

Kind of offer and repetition: **Frontal lesson (4 hours), supported lab. Once a semester**

Enrollment:

<https://tinyurl.com/peoPLe-DEIB-RobotEmozionati>

14. HIGH-SPEED SIGNAL INTEGRITY

ABSTRACT

Design and analysis of interconnects in high-speed electronic systems; understanding of high-speed signal propagation and signal integrity concepts; electromagnetic simulation tools and experimental techniques.

COURSE ORGANIZATION

1. Lectures (5 hours): Introduction of signal integrity issues for the design of high-speed interconnects (Polimi staff).
2. Simulation (8 hours): Keysight Technologies will introduce electromagnetic and signal integrity simulation with Keysight EDA tools; Simulation case studies will be proposed to the students, who will solve them with the help of tutors.
3. Measurement and simulation (7 hours): SECO Embedded Creators will present design issues of a computer on a board. Experimental demonstration of a practical use case (udoo project) of debugging of signal integrity failures will be presented, and fixed by the students through simulation and experiments on demo boards.

COURSE DETAILS

Activity type: **Lectures e Laboratory**

Duration: **20 hours**

Max number of students: **60**

Teaching staff: **Flavia Grassi, Salvathours Levantino**

Delivery Dates: **March 2018 – June 2018 (II semester).**

Contacts and information: **Prof.ssa Flavia Grassi**

Teaching language: **English**

Delivery mode and repetition: **once per year.**

Registration:

<https://tinyurl.com/peoPLe-HighSpeedSingIntegrity>

15. MACHINE LEARNING FOR GEOPHYSICAL DATA INTERPRETATION

OBJECTIVES

The course focuses on a multidisciplinary topic that requires computer science, signal processing, and geology skills. Its main goal is therefore to present a teamwork experience where knowledge is exchanged and advanced analysis tools are developed and made available to the participants.

ABSTRACT

Non-destructive exploration of the subsurface makes use of elastic and/or electromagnetic waves that collect, during their propagation, information on the crossed medium. The processing and interpretation of these "geophysical" data is carried out with a multidisciplinary approach and it allows to identify specific "markers" of the scenarios under investigation. The proposal concerns the application of Machine Learning techniques to geophysical data, the recognition of these markers and the construction of subsurface parameter maps. The experimental activity will be performed on well log data, that describes the petrophysical properties of the layers crossed during drilling. This data has recently been used in a competition for the validation of automatic interpretation techniques, and it is of great interest to check if it is possible to improve the results obtained during this "challenge".

The activity will be carried out in close contact with ENI, that will provide the data.

COURSE DETAILS

Activity type: **Lectures e Laboratory**

Duration: **20 hours**

Max number of students: **60**

Teaching staff: **Giancarlo Bernasconi, Paolo Bestagini**

Delivery Dates: **march 2018- june 2018 (II semester).**

Contacts and information: **Prof. Giancarlo Bernasconi**, email: giancarlo.bernasconi@polimi.it

Teaching language: **Italian/English**

Delivery mode and repetition: **Annual.**

How to enroll:

<https://tinyurl.com/PeoPLe-DEIB-MachineLearningGeo>

16. CREATIVE COMPUTING FOR ARTISTIC PERFORMANCES

COURSE OBJECTIVES

The course module "Creative Computing for artistic performances" is aimed at:

- acquiring tools and techniques for the rapid development of software and hardware solutions in support of the artistic performance in a wide sense;
- learning the fundamentals of music informatics, interaction design, audio processing and movement processing.

ABSTRACT

The planned activities are based on two extended seminars of 6 hrs each (or three seminars of 4 hrs each) and a final project/competition (hackathon).

The cycle of seminars will cover the following:

1. Tools and languages for rapid prototyping: Processing, Python, Web Technologies (HTML, PHP, Javascript, CSS), EyesWeb
2. Team work and open-source projects: SW and platforms for versioning: Git/Mercurial and access to Github repository
3. HW and IoT: Raspberry PI, Arduino, Kinect, Gamepad Bluetooth, MIDI controllers, etc.
4. Use of third-party APIs: Spotify, Lastfm, Twitter, etc.
5. Standard communication protocols: OSC, MIDI, socket, client-server architectures.

The course will end with a hackathon-style competition.

Themes: audio / music / movement (dance or interaction)

Course and hackaton open also to external participants (community of researchers in the areas of audio/music information retrieval; developers, musicians, designers, other students)

Teams will be freely assembled, the students will be potentially able to work with researchers or professionals, and establish a network of contacts.

COURSE DESCRIPTION

Type of activity: **Workshop followed by hackaton**

Duration: **27 hrs (Seminars: 15 hrs, Competition: 15 hrs)**

Max number of participants: **60**

Instructors: **Augusto Sarti, Massimiliano Zanoni, Michele Buccoli**

Delivery period: **March 2018 – June 2018 (II semester).**

Contacts and signups: **Prof. Augusto Sarti**

Language: **Italian/English**

Frequency of the course: **once a year.**

How to enroll:

<https://tinyurl.com/PeoPL-DEIB-CreativeComputing>

17. XOHW PoliMi BOOTCAMP

OBJECTIVES

- Learning basic and advanced topics on heterogeneous systems and architectures;
 - Learning main tools for FPGA;
 - Learning how to organize and manage a complex technical project.
-

ABSTRACT

The XILINX FPGA Design contest is an international challenge organized by Xilinx, company leader in the market of FPGA technology, which gives students the opportunity to work on a medium term hands-on project to showcase their technical and creative skills.

The contest is divided into three project categories:

- PhD
- Student
- PYNQ

Five prizes in total will be awarded: two to the best PhD projects, two to the best student projects and one for the PYNQ category.

Projects will be judged equally across all of the following categories:

- Technical complexity (20%)
- Implementation (20%)
- Marketability/Innovation (20%)
- Documentation and written report (20%)
- Reusability (20%).

The HOHW Bootcamp is one year training camp born for introducing students to advanced topics on heterogeneous systems architectures.

From November to December they will have the opportunity to attend the PhD course “_____” provided by professor Santambrogio and professor Miele. During the course students, will be introduced to the following topics:

- Basic principles;
- Introduction to FPGA-based design;
- Real needs and limits;
- FPGA reconfiguration;
- SoC design on FPGA;
- High level synthesis for FPGA
 - Vivado and Vivado HLS;
- a bird's eye view on VHDL;
- SDAccel and FPGA for F1 Amazon Instances.

At the end of December students will have the opportunity to get access to the pre-release of the online course realized by professor Santambrogio in partnership with Coursera on these topics.

Type of activities: **one year training camp followed by the XOHW Hackaton.**

Professors: **Marco D. Santambrogio, Antonio Miele**

Time schedule: **November 2017- June 2018**

Language: **Italiano/Inglese**

Timetable

- 29th November from 1.30 pm to 5.30 pm, Seminar Room
- 30th of November from 1.30 pm to 5.30 pm, Seminar Room

- 4th December from 1.30 pm to 5.30 pm, Seminar Room
- 5th of December from 1.30 pm to 4.30 pm, Seminar Room
- 11th of December from 9 am to 12 pm, Seminar Room
- 12th of December from 2.30 om to 5.30, NECSTLab Meeting Room
- 14th of December from 9 am to 12 pm, Alario Room
- 18th of December from 9 am to 12 pm, Seminar Room
- 20th of December from 1.30 pm to 4.30 pm, Seminar Room

Between January and February there will be a first assessment points. Those students who will prove to have understood and learnt what FPGA are and how to use main related tools, will have access to the second part of the bootcamp and divided into groups for competition projects.

During the second semester two main activities will take place:

- Specialization courses on more advances topics;
- Weekly meeting for preparing the contest (Mach to June, from 5 pm to 7 pm).

Specialization courses will cover around 20/25 hours overall.

VIVADO

11th of January 4 pm-8 pm

18th of January 4 pm-8pm

25th of January 4pm-8pm

SDAccel

1st of February 4 pm-8pm

8th of February 4 pm-8pm

15th of February 4 pm-8pm

22nd of February 4pm-8pm

Students will also have the opportunity to take part in two different hackathons (participation is not mandatory):

- 2nd half of November, Floorplanner Design Contest
- 3 April, SDAccel Design Contest.

Registration procedure:

HOHW Polimi Bootcamp

<https://tinyurl.com/PeoPLe-DEIB-HOHWPolimiBootcamp>

Floorplanner Design Contest

<https://tinyurl.com/peoPLe-DEIB-FloorplannerDesCon>

SDAccel Design Contest

<https://tinyurl.com/peoPLe-DEIB-SDAccelDesCon>

Corso di dottorato Argomenti avanzati su architetture e sistemi eterogenei

<https://tinyurl.com/PEoPLe-DEIB-hetcomputingsystem>

18. Sport and Wellness Hackathon Bootcamp @NECSTLab

OBJECTIVES

- Learning how to use available technology (hardware and software);
 - Learning how to organize and manage a complex project;
 - Learning how to develop a proof of concept;
 - Learning how to efficiently communicate a technical project;
 - Learning how to validate an idea from a user's point of view.
-

ABSTRACT

The Sport and Wellness hackathon is a 48 hours event organized by NECST Laboratory in partnership with ITERPRO, an Italian startup aiming at filling the gap between practice and sports science, in order to turn data into action and help football clubs to make better decision faster.

From November to January students will have the chance to learn how to use the main technology (hardware and software) that will be available during the hackathon.

Participants will be also trained on:

- How to develop a proof of concept;
- How to validate an idea from a user's point of view;
- How to efficiently communicate a technical project (non-verbal communication, social media, differentiate communication on the base of target and time)

In February participants, will be selected into max 25 teams (max 5 students per team) and the hackathon will take place during the first weekend of March.

At the end of the hackathon each team will be asked to deliver the prototype of their project. The 5 selected teams will attend the final event in May.

The final event will take place at the headquarter of a very important sport company.

6th of December, 5 pm -7pm, Room D32
13th of December, 5 pm - 7 pm, Room D32
15th of December, 4pm-7pm , Room L2615
20th of December, 4pm -7pm, Room D32
15th of January, 3 pm -5.30 pm, Room D12
17th of January, 3 pm-5.30 pm, Room D32
19th of January, 3 pm - 5.30 pm, Room D12
5th of February, 2 pm-5pm, Room D11
12th of February, 2 pm -5pm, Room D11
19th of February, 2pm-5pm, Room D11

Registration procedure: <https://tinyurl.com/PEoPLe-DEIB-WellnessSportHacka>
