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Technology for Rapid Prototyping

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1. Course description / Introduction to the course

From the words of Steve jobs: "Innovation is the only way to win."
Whether big or small, any company, no matter the sector, must have
innovation at its core. These companies will need to include in their
teams leaders that understand the innovation process, drive change,
and stimulate disruption.

Theodore Levitt wrote: "Creativity is thinking up new things. Innovation
is doing new things". These phrases express that an idea is just not
innovation until it is **made real**.

With the new tools of digital fabrication, rapid prototyping has become
a luxury no company should do without.

In the last decade, a number of game-changing new practices and new
technologies redefine the rules of the game of innovation and make it
accessible to anyone.

3D printing is not a new technology; **the fact that it is accessible to
anyone is new**.

Open Design, open hardware, and other collaborative practice not
only impose businesses to redefine their strategy or invent business
models that will allow them to remain competitive, but it is taking
prototyping to new stages of development for fraction of the cost it use
to have.

Companies need collaborators that understand the new rules and
that know what it takes to remain on the leading edge of innovation;
people that while business oriented and focused on customers'
needs, understand the tricks to **agile product development** and
prototyping.

Prototyping, and the creation of a MVP (minimum viable product)
is not reserved to the sole software or web industry, these are
practices that any company can and should integrate in the
innovation chain.

IoT like 3D printing is ubiquitous. These are spreading across all
industries and will be key components of the economy in the coming
decades.

3D printing impacts all industries and the global 3D printing market size
is expected to exceed $10B before 2020. While the economic value
IoT/IoE will be measured in tens of trillion dollars by 2030

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2. Learning objectives and competencies

Having followed this course, students will acquire the following knowledge or skills:

1.   Realize the ease of prototyping: cheap, fast, accessible
2.   Realize the importance of disruption to survive in the business world.
3.   Understand how society needs to reinvent itself and how this could impact the world economy on a macro scale as well as on the micro scale.

Acquire the skills to be the driving agent of innovation in the companies of all activity sectors

3. Course Format and methodological approach

The FabLab network as a clear mission of education and divulgation; and the teaching approach is strongly based on the PBL (project based learning) methodology. In the learn-by-doing approach (and by extension our own learn- by-making) the skills are acquired by practicing, Making objects will not only have you seek out on your own for the knowledge your are missing to complete a project, it will make you realize how much you already know and how you can apply that knowledge.

The course combines lectures, class discussions, group work and hands-on practice.
The required readings and the lecture will give you the context. It will give you a sense of the potential impact of recent advents in technology as well as giving you an understanding of the underlying changes that are taking place in society. You will get to practice new skills through the realisation of a project using the machines of the FabLab. Finally, a group project will help you realize how your quickly acquired new skills can help you develop a prototype to very rapidly test Market validation.

Participation
Project based learning, means that the value of this course is through active participation. You will be expected to participate, to challenge concept that are presented and overall to enrich the experience of all by sharing your perspective and experience. Participation and teamwork are key to the success of your learning experience.

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4. Course Content

1.– Intro to the Maker's economy

The game is changing; new rules for a new economy.
Discussion on pre-class readings (articles, book)
Sharing Economy Disruption
Re-localization (Glocal)
Agile development =>Speed vs. size DIY – DIWO
Introduction to 3D printing.

2. - 3D
Practicing 3D modelling and design. Definition of the problem: Creation of teams / Project definition
Start 3D printing

3 - Subtractive manufacturing, a nice complement to 3D printing
2D design for the laser cutter.
From 2D to 3D. Progress on Project

4 - Electronics, giving life to the projects
Intro to Arduino. From 2D to 3D. Progress on Project

5 – Project finalisation and presentation
Basics of pitching. Project finalization.
Pitch (10 minute per group)

5. Assessment

Attendance and active participation 40%
Pre class reflexion 15%
Project advancement 10%
Peer evaluation 10%
Final project presentation 25%

6. Materials

Reading:
- SMART REGIONS, SMART CITIES – A Digitally Interconnected and Ecologically Sustainable Third Industrial Revolution – Jeremy Rifkin
- MAKERS: THE NEW INDUSTRIAL REVOLUTION –Chris Anderson

For the hands on practice, the students will have access to FabLab Sant Cugat, a lab with cutting edge technology based on machines recommended by the MIT. will be at the disposal of the student with the guidance of expert machine operators.
- Laser cutter
- 3D printer
- milling machines
- CNC routers