CIRCULAR ECONOMY: DESIGN FOR THE FUTURE
Total Course Load: 40 hours

Course Description:
The future is our contemporary!

So are its challenges and possibilities for solutions. The course proposes a deep incursion in the future as it provides to all students a set of theoretical, practical and group work experiences aimed at identifying and designing solutions to problems that lie ahead. In this sense, the course builds upon a project-based learning approach in which the development of a Circular Economy intervention guides learning and reflection.
The course converges towards the search for epistemological and methodological integration between Economics, Business and Engineering at INSPER. The course unfolds upon three articulated axes.

The **first axis develops the concept of Circular Economy** through lectures and a handful of real circular solution cases. Circular Economy is an advanced economic and harmonious industrial system that relies on the systematic application of strategies that slow, close or narrow material and energy flows aiming for a sustainable future (KIRCHHERR; REIKE; HEKKERT, 2017). Ideally, the cycles of materials – technical and biological nutrients – and energy enable reducing to zero the need for additional resource input and waste leakage to maintain a specific system (ELLEN MACARTHUR FOUNDATION, 2013). Issues such as systems thinking (MEADOWS, 2008), natural capital valuation (COSTANZA, 1997), servitisation (STAHEL, 1997), sharing economy (RIFKIN, 2014), and life-cycle engineering (UNEP, 2007) are central for the Circular Economy concept and will be discussed throughout the development of the first axis. It sustains the conceptualization of an envisioned system and definition of the metrics to evaluate the solutions proposed.

The **second axis** involves **comprehending the role of Systems Thinking to achieve transitions** into radically new sociotechnical structures like the Circular Economy. Thinking in systems enables understanding the complex network of causes and effects emanating from a problematic system (MEADOWS, 2008), e.g. the linear economy threatening Earth stability (STEFFENS et al.,2015). Envisioning and creating paths for the transition to the desired situation is enabled by understanding the causal structure of the as-is system. On the other hand, path dependence from cultural and infrastructural conditions restrict the options for today's interventions. Also, interventions may enact rebound effects, i.e. unintended systemic responses that can even overcome envisioned benefits. This way, Systems Thinking is embedded in this course to facilitate defining and prioritizing viable paths of transition from a linear to a Circular Economy.

The **third axis** unfolds in the **development of an intervention in the form of a business model and compelling narrative of change**. Students will be encouraged to envision a long-term intervention, to back cast to a solution that enables that desired future right away, and to carry out experimentation of such solution through minimal viable products and prototypes towards implementation. Design good practices and methods will be provided to

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the teams (e.g. IDEO, 2016, LOORBACH, 2010). Students should develop the narrative necessary for validating the proposed business model along with users and specialists.

In this course, designing for the future means conceptualizing, prioritizing and experimenting interventions that enable the Circular Economy.

Objectives:
At the end of the course, students should be able to:
- Understand and represent systems composed of multiple causes and feedback structures.
- Understand the Circular Economy concept and identify ideal cases that exemplify its application.
- Select and apply methods to design, prioritize and experiment interventions to achieve a more desired (and more circular) future within a specific context.

Throughout the course, students will be stimulated to develop skills such as teamwork and communication.

Program Content:
1. Axis 1: Circular Economy
a. The Anthropocene and the Linear Economy flaws
b. CE Concept and related schools of thought
c. Types of circular solutions and cases classification
2. Axis 2: Systems Thinking
a. Developing Multiple Cause Diagrams
b. Assessing future behavior and impacts 3. Axis 3: Intervention design (Hands-on)
a. Designing for Transitions
b. Circular value design and experimentation

Basic Bibliography

Books:
ELLEN MACARTHUR FOUNDATION. Towards the circular economy: Economic and business rationale for an accelerated transition. Cowes, UK: [s. n.], 2013. E-book.
MCDONOUGH, Willian; BRAUNGART, Michael. Cradle to Cradle: Remaking the way we make things. New York: North Point Press, 2010.
MEADOWS, Donella H. Thinking in Systems: a Primer. London: Earthscan, 2008.

Complementary Bibliography

Books:
BOCKEN, Nancy et al. Product design and business model strategies for a circular economy. Journal of Industrial and Production Engineering, v. 33, No.5, p.308- 320, 26 abr. 2016.
FRIEDMAN, Thomas L. Thank You for Being Late: An Optimist's Guide to Thriving in the Age of Accelerations. New York: Farrar, Straus and Giroux, 2016.
GRIGGS, David et al. Sustainable development goals for people and planet. Nature, v. 495, p. 305-307, 21 mar. 2013.
IDEO. The Circular Design Guide. 2017. Available at:

https://www.circulardesignguide.com/. Access in: 19 abr. 2019.
LOORBACH, Derk. Transition Management for Sustainable Development: A Prescriptive, Complexity-Based Governance Framework. Governance: An International Journal of Policy, Administration, and Institutions, v. 23, n. 1, p.
161-183, Jan 2010.

Articles:

SIMON, Herbert A. The Sciences of the Artificial. 3. ed.: The MIT Press, 1996. 231p.
STAHEL, Walter. Circular Economy. Nature, v. 531, p. 435-438, 24 mar. 2016.
STAHEL, Walter. The service economy: 'wealth without resource consumption'?. Philosophical Transactions of the Royal Society A, Great Britain, v. 355, n.
1728, p. 1309-1319, 1997.

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