**SPINAKER Winter School course**

**Economic Dimensions Of Complexity**

**Course description**

This course covers the concept of complexity and its relevance to various fields such as economics, finance. Students will learn about the different types of complexity, including structural and dynamical complexity, and the antecedents that contribute to complex systems. They will explore how judgmental errors and biases can reduce complexity and provide mental models that simplify decision-making processes, but can also lead to systematic errors if not based on accurate information. The course will examine the implications of complexity. Students will be introduced to systems thinking and system approaches as tools for solving complex problems, and study the works of scholars such as Peter Senge, John Sterman, Jay Forrester, Donella Meadows, Peter Checkland, and Russell Ackoff. They will learn about the hard and soft system approach tools, including causal loop diagrams, stocks and flows diagrams, the iceberg metaphor, and rich pictures, and their applications in understanding the dynamics of crises, the dynamic effects of investments, and debt accumulation. Upon completion of the course, students will be able to analyze complex systems and identify potential solutions using a systems approach.

**Subject’s learning outcomes**

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| **Outcomes in terms of** | **Examination methods** |
| **Knowledge – Student knows and understands:** |  |
| * The antecedents of problems like financial crises, wars, and global warming. * Why businesses suffer from periodic crises, sales, earnings, and morale fluctuations * Terms like system, causal loops, stocks and flows, equifinality, control, self-organization, complex dynamic systems, feedback, bifurcations, attractors, chaos, order, emergence, suboptimality, requisite variety | Essay |
| **Skills – Student can:** |  |
| * Apply Causal loop diagrams * Apply Stock and Flows diagrams * Link feedback with stock and flow structure * Propose solutions for fixing problems emerging because of the Forrester effect | Essay |
| **Social competences – Student is ready to:** |  |
| * Communicate the importance of complex problems; * Develop the relations among the team members * Learn collaboratively in the team and present the findings of teamwork | Essay, Discussion during lectures |

**Calculation of ECTS points**

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| **Activity form** | **Activity hours\*** | |
| Lecture | 6 | |
| preparation for classes | 15 | |
| preparation for the exam | 5 | |
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| **Student workload** | **Hours**  20 | **ECTS**  1 |
| **Workload involving teacher** | **Hours**  6 | **ECTS**  1 |

\*hour means 45 minutes

**Study content**

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| 1. | Complexity definitions, types, implications | Understanding and interpreting the term complexity and knowing how complexity can impact the emerging of global complex problems like financial, political, and economic crises, contagion effects, value chains disruptions |
| 2. | Systems thinking definitions | Judgment errors and biases in thinking about complexity  Process of systems thinking, Analysis and Synthesis, Systems thinking advantages and weaknesses, Differences between linear and systems thinking |
| 3. | System definitions | System attributes, inflow, outflow, feedback, |
| 4. | System approach evolution | The system approach evaluation from General Systems Theory toward Complexity Theory  Evolution of the system approach as the movement toward explaining the complexity |
| 5. | General Systems Theory | Historical development, philosophy and theory, methodology, methods, recent developments of General Systems Theory |
| 6. | System Dynamics | Historical development, philosophy and theory, methodology, methods, recent developments Systems Dynamics |
| 7. | Causal Loops Diagrams, Stocks and Flows | Causal Loops Diagrams and Stocks and Flows Diagrams applications in solving complex problems |

**Course advanced**

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| **Activities** | **Examination methods** |
| Lecture with multimedia presentation  Conversation lecture | Essay  Essay |

**Literature**

**Obligatory:**

* Meadows, D. H. (2008). Thinking in systems: A primer. chelsea green publishing.

**Optional**

* Sterman, J. (2002). System Dynamics: systems thinking and modeling for a complex world, Jackson, M. C. (2016). Systems thinking: Creative holism for managers. John Wiley & Sons, Inc.