Syllabus

Course Description

Course Title	Growth Mindset
Course Code	25555
Course Title Additional	
Scientific-Disciplinary Sector	
Language	English
Degree Course	Master in Entrepreneurship and Innovation
Other Degree Courses (Loaned)	
Lecturers	dr. Silvia Sanasi, Silvia.Sanasi@unibz.it https://www.unibz.it/en/faculties/economics-management/academic-staff/person/47276 Dott. Cristina Maria Gangai, CristinaMaria.Gangai@unibz.it https://www.unibz.it/en/faculties/economics-management/academic-staff/person/50466
Teaching Assistant	
Semester	First semester
Course Year/s	1
CP	14
Teaching Hours	Module 1 – 36 hours Module 2 – 48 hours
Lab Hours	Module 1 - 16 hours Module 2 - none
Individual Study Hours	-
Planned Office Hours	Module 1 - 18 hours Module 2 - 24 hours
Contents Summary	M1: This project-based course introduces students to design thinking and prototyping as key tools for developing a growth mindset in the context of entrepreneurship and innovation management. Working in diverse teams, students tackle real-world

	challenges by designing and testing new product or service ideas. They will learn and apply the design thinking process alongside core principles from other foundational approaches to innovation and entrepreneurship, such as Design Sprint and the Lean Startup method. Due to the highly interactive, team- and project-based nature of the course, attendance is mandatory (min. 75%) M2: The course introduces students to the fundamentals of programming using Python, with a focus on syntax, control structures, and logical reasoning. It also covers essential topics in computational complexity and classical algorithms for solving problems such as sorting, recursion, and combinatorial optimization. The course is designed not to train professional programmers, but to foster a problem-solving mindset and a structured approach to thinking, particularly valuable for future entrepreneurs and project managers.
Course Topics	Course Topics – M1: -Design thinking: Definitions and origins -Design thinking process: Emphathize & discover -Design thinking process: Define - Problem framing & reframing -Design thinking process: Ideate & sketch (incl. Design Sprint method, Value Proposition Canvas, Customer journey map, Service blueprint) -Design thinking process: Testing & Experimentation (incl. Lean Startup method) -Pitching an innovation project -Real-world case studies - Digital and physical prototyping Course Topics – M2: 1. Introduction to Programming with Python: Basic syntax and program structure. Variables, data types, and operators. Input/output and simple scripts 2. Control Structures and Logical Reasoning: Conditional statements (if, if-else, nested conditions). Loops (for, while) and iteration strategies. Logical operators and Boolean reasoning 3. Functions and Problem Decomposition: Defining and calling functions. Parameters, return values, and scope. Modular

	programming and code reusability 4. Data Structures for Problem Solving: Lists, tuples, and strings. Sets and dictionaries: properties and use cases. Iterating over structured data 5. Algorithmic Thinking: Problem analysis and step-by-step reasoning. Designing algorithms using flowcharts 6. Foundations of Computational Complexity: Time and space complexity: intuitive introduction. Big-O notation and growth rates of functions. Practical comparisons of algorithm efficiency 7. Classical Algorithms: Sorting algorithms (e.g., Bubble Sort, Merge Sort). Searching strategies (linear search, binary search). Recursion: principles and applications (e.g., factorial, Fibonacci) 8. Combinatorial Optimization and Graph Problems: Introduction to optimization problems (e.g., Knapsack problem). Shortest-path algorithms (e.g., Dijkstra's algorithm)
Keywords	M1: Design thinking, innovation, problem framing, ideation, prototyping, experimentation M2: Algorithms, Python programming, time complexity, problem-solving.
Recommended Prerequisites	M1: None. M2: General logical reasoning skills, Basic knowledge of mathematics (e.g., arithmetic, simple algebra, sets)
Propaedeutic Courses	
Teaching Format	M1: Lectures, laboratory activities, company visits, groupwork, individual reflection. In-person attendance is mandatory (min 75%) M2: The course combines lectures with interactive exercises, coding practice in Python, and problem-solving sessions.
Mandatory Attendance	M1 Design Thinking & Prototyping - 75% mandatory presence
Specific Educational Objectives and Learning Outcomes	Knowledge and understanding The student acquires advanced knowledge and understanding of the models and instruments of economic-business analysis for the creation of a new company with particular attention to the identification of new market opportunities, the availability and procurement of economic-financial resources and technological and

	organisational skills for the development of the company The student acquires advanced knowledge and understanding of the models and tools of economic-business analysis for the management of a new enterprise, from the financial and organisational point of view and with respect to the dynamics of growth and development I/we acquire advanced knowledge and understanding of the theories and tools for the economic analysis of business decisions. I/we acquire knowledge and understanding of theories and tools for the economic analysis of the market, at the level of the individual enterprise and the supply system I/we acquire knowledge and understanding of the theories and tools of statistical analysis for making market forecasts I/we acquire knowledge of the legal forms required for setting up a company and for the legal protection of intellectual property rights I/we acquire advanced knowledge and understanding of models for new product development and innovation management within enterprises I/we acquire advanced knowledge and understanding of business analysis tools and solutions for the development of innovations and organisational knowledge I/we acquire advanced knowledge and understanding of innovation economics models and systems for regional innovation development The student acquires knowledge of quantitative models for the formulation of forecasts necessary to guide management decisions and to predict the life cycle of a product and a sector Ability to apply knowledge and understanding ability to acquire and select information that may be relevant from an entrepreneurial point of view, also in economic-productive contexts different from those studied ability to analyse the combination of market opportunities and resources of the enterprise and to identify entrepreneurial formulas, also with the elaboration of original, compatible and sustainable solutions and combinations ability to acquire and select relevant information to frame cases of innovation (product, service, social, managerial organisational), also different from the studied contexts ability to select product development models, suitable to

	appropriately analyse a specific economic-productive context Autonomy of judgement Acquire the ability to analyse complex entrepreneurial problems, such as the elaboration and evaluation of an entrepreneurial project (business plan) or the development of a new product. Acquire the ability to make predictions, such as analysing the future consequences of entrepreneurial, managerial and operational choices. Autonomy of judgement is developed in the training activities carried out for the preparation of the thesis, as well as in the exercises that accompany the lectures and that involve group discussions and the comparison of individual analyses carried out by students in preparation for the lecture. Communication skills Acquire the ability to describe and communicate in an intercultural context, in a clear and precise manner, problematic situations typical of the management of a new enterprise and the development of innovation, such as, for example, the conditions for the validation of a problem or solution, the prospects and risks associated with a business model or an innovation project. The development of communication competences assumes heterogeneous situations such as, for example, the presence of internal stakeholders (e.g. colleagues, managers, owners), or external stakeholders (e.g. potential investors, suppliers and other business partners) and the ability to sustain an adversarial process. The achievement of these objectives is assessed in the course of the training activities already mentioned, as well as in the discussion of the final thesis. Learning ability Acquire the ability to study independently, to prepare summaries. Acquire the ability to identify thematic connections and to establish relationships between different cases and contexts of analysis Acquire the ability to frame a new problem systematically and to generate appropriate taxonomies. Acquire the ability to develop general models from the phenomena studied.
Specific Educational	M1: By the end of the course, students should:

Objectives and Learning Outcomes (additional info.)	- Understand the basic principles of the Design thinking approach to innovation - Acquire the ability and tools to empathize with users and beneficiaries - Develop critical thinking to frame and reframe user problems - Design innovative solutions building on user research and insights - Rapidly prototype a solution and test it with users - Conduct an innovation project (i.e., new product, service, or system) from start to end - Work collectively in heterogeneous teams and distribute workload M2: By the end of the course, students will: -Understand the basic principles of programming and algorithmic thinking. -Apply control structures, functions, and data structures in Python to solve simple computational problems. -Analyze the efficiency of algorithms using fundamental concepts of computational complexity. -Implement and evaluate classical algorithms such as sorting, recursion, and combinatorial optimization. -Develop logical reasoning and structured problem-solving skills transferable to entrepreneurial and managerial contexts.
Assessment	M1: The evaluation is structured around the following components: -Project work (in teams) on an innovation project addressing the project challenge -Individual written reflection (3 short individual essays submitted at the beginning, middle and end of the course) -In-class participation: active engagement in class and in project reviews M2: Exam Structure The final M2 assessment is structured into three modules: Module 1 – Computer-based written exam on Python syntax:

	programming exercises in Python. This module may be completed during the course as part of a mid-term test. Module 2 – Paper-based written exam on computational complexity and recursion: exercises and multiple-choice questions. This module may also be completed during the course as part of a mid-term test. Module 3 – Paper-based written exam on fundamental computer science algorithms. This module must be completed exclusively during the official exam session. During the official exam session, students are therefore required to complete Module 3, together with any of the first two modules not successfully completed during the mid-term tests.
Evaluation Criteria	M1: The evaluation is structured around the following components: -Project work (in teams) on an innovation project addressing the project challenge -Individual written reflection (3 short individual essays submitted at the beginning, middle and end of the course) -In-class participation: active engagement in class and in project reviews M2: Assessment is based on correctness of code and answers, clarity of reasoning, and appropriate use of algorithms and complexity analysis. Grade is the weighted average of the exam's modules, based on the number of lessons' hours. The overall exam mark will be determined by the assessment of the two modules (M1+M2), using proportional weights based on the respective module credits, to calculate the final grade for the Growth Mindset course
Required Readings	M1: The following readings constitute the core upon which the course is built. Specific readings will be provided as bibliography for each class. • Bland, D. J., & Osterwalder, A. (2019).*¿Testing business ideas: A field guide for rapid experimentation*. John Wiley & Sons.

	• Brown, T. (2009). *Change by Design: How Design Thinking Transforms Organizations and Inspires Innovation*. Harper Collins. • Knapp, J., Zeratsky, J., & Kowitz, B. (2016).¿*Sprint: How to solve big problems and test new ideas in just five days*. Simon and Schuster. • Osterwalder, A., Pigneur, Y., Bernarda, G., & Smith, A. (2015).¿*Value proposition design: How to create products and services customers want*. John Wiley & Sons. • Verganti, R. (2009).¿*Design driven innovation: changing the rules of competition by radically innovating what things mean*. Harvard Business Press. M2: There is no traditional textbook for this course. The learning material is created and developed during the lessons in the form of a course handbook. This handbook is built on a set of lecture notes (Jupyter notebooks), which are progressively completed during class together with the instructor. Students are expected to actively contribute by adding code, explanations, and personal notes, thus creating a customized and evolving resource that supports both in-class learning and individual study.
Supplementary Readings	M1: The following readings constitute additional readings upon which the course is built. Specific readings will be provided as bibliography for each class. Blank, S. (2020).¿*The four steps to the epiphany: successful strategies for products that win*. John Wiley & Sons. Liedtka, J., Chen, E., Foley, N. & Kester, D. (2024).¿*The experimentation field book: a step-by-step project guide*. Columbia University Press. Martin, R. L. (2009).¿*The design of business*: *Why design thinking is the next competitive advantage*. Harvard Business Press. Osterwalder, A., & Pigneur, Y. (2010).¿*Business model generation: a handbook for visionaries, game changers, and challengers*. John Wiley & Sons. Ries, E. (2011). *The Lean Startup: How Today's Entrepreneurs Use Continuous Innovation to Create Radically Successful Businesses.* Crown Business.

	Thiel, P. & Masters, B. (2014).¿*Zero to one: notes on start ups, or how to build the future*. Random House. Thomke, S. H. (2020).¿*Experimentation works: The surprising power of business experiments*. Harvard Business Press. Verganti, R. (2017). *Overcrowded. Designing meaningful products in a world awash with ideas.*¿MIT Press. M2: For those interested in further reading or deepening their understanding, the following books and web resources are are recommended (but not required):: • Horstmann C.S., Necaise R.D. (2019). *Python for Everyone.* John Wiley & Sons • Wirth, N. (1986). “Algorithms and data structures”. Prentice-Hall. • Official Python documentation: https://www.python.org/doc/
Further Information	M2:The course makes use of Anaconda and Jupyter Notebook as the main tools for coding practice and exercises.
Sustainable Development Goals (SDGs)	Decent work and economic growth, Quality education

Course Module

Course Constituent Title	Design Thinking and Prototyping
Course Code	25555A
Scientific-Disciplinary Sector	ICAR/13
Language	English
Lecturers	dr. Silvia Sanasi, Silvia.Sanasi@unibz.it https://www.unibz.it/en/faculties/economics-management/academic-staff/person/47276
Teaching Assistant	
Semester	
CP	6
Responsible Lecturer	

Teaching Hours	36
Lab Hours	16
Individual Study Hours	-
Planned Office Hours	18
Contents Summary	This project-based course introduces students to design thinking and prototyping as key tools for developing a growth mindset in the context of entrepreneurship and innovation management. Working in diverse teams, students tackle real-world challenges by designing and testing new product or service ideas. They will learn and apply the design thinking process alongside core principles from other foundational approaches to innovation and entrepreneurship, such as Design Sprint and the Lean Startup method. Due to the highly interactive, team- and project-based nature of the course, attendance is mandatory (min. 75%).
Course Topics	
Teaching Format	Lectures, laboratory activities, company visits, groupwork, individual reflection. In-person attendance is mandatory (min 75%)
Required Readings	Bland, D. J., & Osterwalder, A. (2019). *Testing business ideas: A field guide for rapid experimentation*. John Wiley & Sons. Brown, T. (2009). *Change by Design: How Design Thinking Transforms Organizations and Inspires Innovation*. Harper Collins. Knapp, J., Zeratsky, J., & Kowitz, B. (2016). *Sprint: How to solve big problems and test new ideas in just five days*. Simon and Schuster. Osterwalder, A., Pigneur, Y., Bernarda, G., & Smith, A. (2015). *Value proposition design: How to create products and services customers want*. John Wiley & Sons. Verganti, R. (2009). *Design driven innovation: changing the rules of competition by radically innovating what things mean*. Harvard Business Press.
Supplementary Readings	Blank, S. (2020). *The four steps to the epiphany: successful strategies for products that win*. John Wiley & Sons. Liedtka, J., Chen, E., Foley, N. & Kester, D. (2024). *The experimentation field book: a step-by-step project guide*. Columbia University Press.

	Martin, R. L. (2009). *The design of business*: *Why design thinking is the next competitive advantage*. Harvard Business Press. Osterwalder, A., & Pigneur, Y. (2010). *Business model generation: a handbook for visionaries, game changers, and challengers*. John Wiley & Sons. Ries, E. (2011). *The Lean Startup: How Today's Entrepreneurs Use Continuous Innovation to Create Radically Successful Businesses.* Crown Business. Thiel, P. & Masters, B. (2014). *Zero to one: notes on start ups, or how to build the future*. Random House. Thomke, S. H. (2020). *Experimentation works: The surprising power of business experiments*. Harvard Business Press. Verganti, R. (2017). *Overcrowded. Designing meaningful products in a world awash with ideas*. MIT Press.

Course Module

Course Constituent Title	Algorithmic Thinking and Coding
Course Code	25555B
Scientific-Disciplinary Sector	ING-INF/05
Language	English
Lecturers	Dott. Cristina Maria Gangai, CristinaMaria.Gangai@unibz.it https://www.unibz.it/en/faculties/economics-management/academic-staff/person/50466
Teaching Assistant	
Semester	
CP	8
Responsible Lecturer	
Teaching Hours	48
Lab Hours	-
Individual Study Hours	-
Planned Office Hours	24
Contents Summary	The course introduces students to the fundamentals of programming using Python, with a focus on syntax, control structures, and logical reasoning. It also covers essential topics in

	computational complexity and classical algorithms for solving problems such as sorting, recursion, and combinatorial optimization. The course is designed not to train professional programmers, but to foster a problem-solving mindset and a structured approach to thinking, particularly valuable for future entrepreneurs and project managers.
Course Topics	Course Topics – M2: 1. Introduction to Programming with Python: Basic syntax and program structure. Variables, data types, and operators. Input/output and simple scripts 2. Control Structures and Logical Reasoning: Conditional statements (if, if-else, nested conditions). Loops (for, while) and iteration strategies. Logical operators and Boolean reasoning 3. Functions and Problem Decomposition: Defining and calling functions. Parameters, return values, and scope. Modular programming and code reusability 4. Data Structures for Problem Solving: Lists, tuples, and strings. Sets and dictionaries: properties and use cases. Iterating over structured data 5. Algorithmic Thinking: Problem analysis and step-by-step reasoning. Designing algorithms using flowcharts 6. Foundations of Computational Complexity: Time and space complexity: intuitive introduction. Big-O notation and growth rates of functions. Practical comparisons of algorithm efficiency 7. Classical Algorithms: Sorting algorithms (e.g., Bubble Sort, Merge Sort). Searching strategies (linear search, binary search). Recursion: principles and applications 8. Combinatorial Optimization and Graph Problems: Introduction to optimization problems (e.g., Knapsack problem). Shortest-path algorithms (e.g., Dijkstra's algorithm)

Teaching Format	M2: The course combines lectures with interactive exercises, coding practice in Python, and problem-solving sessions.
Required Readings	M2: There is no traditional textbook for this course. The learning material is created and developed during the lessons in the form of a course handbook. This handbook is built on a set of lecture notes (Jupyter notebooks), which are progressively completed during class together with the instructor. Students are expected to actively contribute by adding code, explanations, and personal notes, thus creating a customized and evolving resource that supports both in-class learning and individual study.
Supplementary Readings	M2: For those interested in further reading or deepening their understanding, the following books and web resources are are recommended (but not required):: • Horstmann C.S., Necaise R.D. (2019). *Python for Everyone.* John Wiley & Sons • Wirth, N. (1986). “Algorithms and data structures”. Prentice-Hall. • Official Python documentation: https://www.python.org/doc/