

Syllabus Examples

The Set of Concepts Developed by Professors during the "DT Meets STEM" Training Program









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EXECUTIVE SUMMARY

This report presents the results of the "DT Meets STEM" training, where professors from partner universities transformed their STEM courses by integrating Design Thinking (DT) and Project-Based Learning (PBL) methods. It illustrates examples of course revisions based on DT principles, offering practical guidance and highlighting the potential of experiential learning approaches aligned with the "DT Meets STEM Manual" and the "Reference Model for DT Meet STEM."

INTRODUCTION

The "DT Meets STEM" initiative addresses the need for a new educational paradigm, equipping students not only with technical knowledge but also with creativity, empathy, collaboration, and problem-solving skills. This document showcases how professors successfully integrated DT into their STEM courses, fundamentally enhancing student engagement and preparedness for contemporary professional challenges.

This document has been created at the end of a dedicated workshop where professors from the four university partners dived into the Design Thinking process, and it collects all the examples about syllabuses improvements gathered from each participant. The purpose of the paper is to show the role Design Thinking can play in the experiential learning and how this way of learning can help students entering themselves into the world of work.

The workshop was created by Esade group to help professor really understand how to introduce Projectbased learning into their own courses, but mostly was thought to be analysed as a test to better understand the potential improvement of the Manual written by the partners throughout the Teach-Beasts project. The "DT MEETS STEM" manual, in fact, is a tool to be disseminated as a guide in order to give every professor the opportunity to implement DT techniques and help his students in the transition from a university environment to the professional world.

The three-day workshop combined experiential learning with expert mentoring. Participants:

- Experienced each phase of the Design Thinking process (Empathize, Define, Ideate, Prototype, Test).
- Revised their course syllabi by integrating DT principles.
- Utilized practical tools including Miro Boards, Missions, and Milestones.
- Engaged in collaborative sessions promoting interdisciplinary and iterative course design.

As a result of this three-days workshop, participants demonstrated their ability in introducing Design Thinking techniques along the course progress by editing their syllabuses according to the knowledge we provided them.

KEY POINT Design Thinking fosters creativity, empathy, and iterative problem-solving essential for modern STEM education.

How Design Thinking Transforms STEM Courses

Design Thinking transforms STEM education by:

- Focusing on real-world, human-centered challenges.
- Encouraging interdisciplinary collaboration and creativity.
- Introducing iterative processes of prototyping and testing.
- Emphasizing project-based learning linked to societal challenges (e.g., UN SDGs).
- Strengthening critical thinking, problem-solving, and innovation capacities.

Professors restructured their syllabi to:

- Introduce meaningful innovation challenges.
- Engage students in teamwork and active experimentation.
- Balance theoretical knowledge with practical application.
- Use tools like Miro boards, reflective diaries, and milestone tracking.

The DT Process:

Step	Focus
Empathize	Understanding users' perspectives
Define	Clearly framing the right challenges
Ideate	Generating creative and diverse solutions
Prototype	Developing and testing early versions
Test	Collecting feedback and refining ideas

EXAMPLES OF HOW INSTRUCTORS CHANGED THEIR SYLLABUS

Pablo – Esade (Universitat Ramon Llull)

BUSINESS ENTREPRENEURSHIP

Course Overview Before Transformation

The course traditionally focused on developing a comprehensive business plan through theoretical lectures, lacking iterative testing, real market validation, and reflection components.

Design Thinking Integration Process

- Applied iterative cycles using the Business Model Canvas.
- Introduced prototyping and early-stage testing.
- Embedded mid-course feedback sessions linked to prototype evaluation.
- Integrated Sustainable Development Goals (SDGs) into entrepreneurial projects.

Transformed Syllabus Structure

Reorganized modules to align with the DT stages:

Ideation \rightarrow Opportunity Exploration \rightarrow Business Model Prototyping \rightarrow Business Plan Development.

Team-based projects with dynamic mentoring and coaching sessions.

Deliverables included a business plan and reflective diary documenting the process.

New Learning Objectives and Key Activities

- Apply Design Thinking to create, test, and validate entrepreneurial ideas.
- Foster creative risk-taking through "fail fast, fail cheap" approaches.
- Strengthen teamwork, leadership, communication, and project management skills.

Challenges Encountered and Solutions Developed

Challenge

Students struggled with the uncertainty of open-ended problems.

Solution

Early-stage prototyping activities helped them embrace experimentation and iterative improvement.

Updated syllabus

* Changes to the syllabus are marked in red.



Academic year: 2024-2025

Module: BUSINESS ENTREPRENEURSHIP

Designing your Business Model

Barcelona, October 202

Module description / Introduction to the module

The general objective is to give the students a better understanding of key aspects of a new venture creation from idea identification to build up a Business Plan (BP), focusing first on the Business Model (BM).

On the way from the Business Idea (BI) to the perfectly structured Business Plan that allows the launch to the market of a company or a new stage, product, service. To do this, we can and should stop first at the Business Opportunity, to assess whether the window of opportunity exists to make sure that it adds value to someone who is willing to pay for it. We then can and should take a step forward to our second stop, a Business Model, this is a qualitative and/or semiquantitative intermediate stage that allows us to assess, think and design (iterate) how we will make that opportunity happen. Answer, what we need to do for it to reach customers? and that all these are well defined.

So, this Module will begin with participants incorporation into teams who will work to develop a real opportunity for a new business either as a new firm or a new business unit within an existing organization anywhere in the world. Each team should work on a business concept potentially profitable to build up, at the end of the Program, a Business Plan financially viable, able to capture value from the market and to add it to shareholders.

Our aim is to transfer as much as possible the knowledge, the expertise from the faculty to the students, so, an important part of the training will we developed in a workshop format, working in teams, having a plenty dynamic of mentoring & coaching during their academic stage.

Learning objectives and competencies

The entire Program will take students through a journey in which they have the challenge to identify an idea and turn it into an opportunity for which they will define first a business model that creates and captures value to both customers and the organization, which they will then fine tune to turn it into a business plan by incorporating financial numbers into

it. -refers to a newly implemented business. Being able to have this 360° vision of an organization is necessary to make the correct decisions.

At the end of the course, students should:

Understand and apply: the basic entrepreneurship concepts, the business model, the frameworks, and tools used to identify opportunities, focusing on Business Model Canvas.

Be familiar with the concept of value creation and value capture.

Understanding of these concepts by applying them to their own business ideas case. -

By the end of the course, you will have learned and experienced the challenges associated with the different business model components. different components to turn an idea into a business plan, or kill the idea based on evidence. In a nut shell you will develop and experience the "fail fast- fail cheap" mindset.

NECESSARY SKILLS:

To be successful you will need to leverage and develop the following skills: creativity, critical thinking, problem solving, team building, leadership, organization, communication, project management and decisions.

Module format and methodological approach

This course follows a combination of lectures, learning by doing and self-learning to achieve the module goals. The module is divided into:

Lectures.

Workshops (practical / participative sessions).

Presentations (group assignments and challenges).

The lecture/discussion sessions are often accompanied by assigned readings, which may be articles, book chapters, class notes and/or videos. You must read all the material before class, as it's not going to be explained again, and it will form the basis for the lecture. Please check eCampus daily to make sure you are informed about any changes.



During workshop sessions, students will have access to a teacher who will provide coaching during their Business Plan trip. Reality is changing very fast, and we combine two sources of knowledge, academic and real experience, for increasing and up-dating know-how for taking good decisions as a manager in the future.

What do we expect from you in class?

This is a hands-on discussion module, so we encourage your active participation. Sharing your experience with the group will enrich all the participants and make the sessions more dynamic.

4. Module content

The modules covered are intended to answer these business questions. Module introduction: Business Models, introduction to Business Model Canvas (BMC). How do you visualize a business? Module: The Value Proposition What distinguishes you from your competitors? Module: Customer segments Which customers do you try to serve? Module: Customer Relationship How will you get new and keep actual customers? Module: Channels How will you deliver your product or service? Module: Revenue Streams How do you make income from customers? Module: Cost Structure How do you make profits from customers? Module: Key Resources What are the investments you need to run your business? Module: Key Activities How will you execute your value's proposition? Module: Key partners. Which partner network do you need to implement your business? Assessment 10% Class Participation (Individuel)

- 10% Class Participation (Individual)
- 20 % Peer review (Individual)
- 20% Final Exam (Individual)
- 50% Group group assignment presentations (Intermediate 10%, Final 40%)

Notes on Class participation:

Grading class participation is necessarily subjective. However, we try to make it as "objective as possible". Some of the criteria for evaluating effective class participation include:

This is a hands-on learning experience; hence attendance is mandatory. Only individuals attending 100% of the classes are eligible for a full score in participation. It is strongly recommended that you make sure you sign the attendance sheet for each class. They will not be available past dates!

Is the participant prepared? Do comments show evidence of analysis of the case? Do comments add to our understanding of the situation? Does the participant go beyond

simple repetition of case facts without analysis and conclusions? Do comments show an understanding of theories, concepts, and analytical devices presented in class lectures or reading materials?

Is the participant a good listener? Are the points made relevant to the discussion? Are they linked to the comments of others? Is the participant willing to interact with other class members?

Is the participant an effective communicator? Are concepts presented in a concise and convincing way?

Is the participant using the devices (laptops, phones, tablets, etc.) when allowed to contribute to the team's challenges / objectives of the workshops?

Notes on Peer review:

The journey from idea to business plan will require individual and team work both outside and inside the classroom. This makes it impossible to monitor the contribution each individual has to the project. For this reason:

Each individual will assess their teammates individual contribution to the project according to their perception.

This information is strictly confidential and only the final aggregated result will be shared.

This assessment is mandatory, if an individual does not assess their teammates peers, then that person will be graded "0" (zero) for the peer review.

Notes on Exam:

The exam consists of 20 true/false and multiple-choice questions on the key concepts from the class. The intention is for students to identify and confirm the knowledge the have acquired though out their theory and practice on their projects.

Notes on Teams:

Teams will be assigned to participants. Each team will be expected to identify a "Team Leader", and a "Scriba", which will be multitask roles, the rest will be contributing experts, may assign other key skills like finance.

Budget: number of hours that you may need to invest will be in the range of (X-Y = based on class hrs x 2 x team members) depending on the business idea the team selects..... more content to be reviewed updated, (LEVERAGE ON MATTEO'S SYLABUS FOOD FOR THOUGHT...)...Team roles

Materials

A4, A3, and A2 blank papers + post-it notes + floppy pens.

Blank, S.G. and Dorf, B., "Startup Owner's Manual", K&S Ranch Publishers, 2012.

In Bygrave, W.D. and Zacharakis, A. (Eds.) The Portable MBA in Entrepreneurship. John Wiley and Sons, Inc.

Mullins, J.W. and Komisar, R., Getting to Plan B: Breaking Through to a Better Business Model. Boston. Harvard Business Press. 2009

Osterwalder, A. and Pigneur, Y., Business Model Generation, New Jersey; John Wiley & Sons, Inc., 2010.

Verzuh, E., The Fast Forward MBA In Project Management, Third Edition, John Wiley & Sons Inc. New Jersey. 2008.

Gimbert, Xavier, Think Strategically. Palgrave Macmillan. 2011.

http://www.slideshare.net/Alex.Osterwalder - Business Model Canvas.

http://ecorner.stanford.edu/podcasts.html - Talks with entrepreneurs & investors.

http://steveblank.com/ - Customer Development model.

https://data.worldbank.org/ - Free and open access to global development data

https://www.cia.gov/the-world-factbook/ - The World Factbook provides basic intelligence for 265 world entities.

https://es.statista.com/ - data and indicators for more than 170 sectors in more than 150 countries.

<u>https://www.esade.edu/library/en</u> - plenty of tools to find insights on industry and market trends, includes for example access to Statista, Sabi, .

http://www.infonomia.com - Innovation and technological perspectives.

http://www.guiame.net - Companies guide from esade

http://www.evca.com - European Association of venture capitalists

http://www.fastcompany.com - Most innovative companies

http://www.acc10.cat/ACC10/en/ - ACCIÓ - Agency for Business Competitiveness

https://www.barcelonactiva.cat/barcelonactiva/en/index.jsp- Barcelona Activa's vision consists of making Barcelona an international benchmark city for working, starting up and living with environmental and social values

Timetable

(Information obtained from the Registrar's Office.)

The following time table may be adjusted based on the teams progress to achieve the deliverables.

18-sep.	25-sep.	2-oct.	9-oct.	16-oct.	23-oct.	30-oct.	6-nov.	13-nov.	20-nov.	27-nov.	4-dic.
Team Building	Idea	ldea	Opportunity	Opportunity	Intermediate Presentation	Business Model	Business Model	Business Model	Business Plan	Exam & Coaching	Final Defense

ADD SDG's

This module is strictly ruled by ESADE's Honour Code

Honor code

"I will not lie, cheat or steal to gain an academic advantage. I will respect all ESADE students, faculty and staff with my words and deeds."

The violations of the ESADE MBA Honor Code include the following:

Lying: Lying includes knowingly communicating an untruth to gain an unfair academic or employment advantage.

Cheating: Cheating includes, but is not limited to, using unauthorized materials to complete an assignment; copying the work of another person; unauthorized providing of materials or information (e.g. proprietary module information) to another person; plagiarism; unauthorized providing of materials or information to another person during an exam. All communication, written, oral or otherwise, among students during examinations, are forbidden, as is the use of notes, books, computers, calculators or other written material except when approved by the instructor.

Stealing: Stealing includes, but is not limited to, taking the property of another member of the ESADE community without permission, defacing or vandalizing the property of the ESADE Business School, or the misuse of ESADE resources.

Respect for others and professional conduct: Respect for others includes treating all ESADE students, staff, faculty and external contacts connected to the school with politeness and cordiality, refraining from using abusive language or physical violence.

Upon witnessing a violation of the Honour Code, a student has a moral obligation to inform the student whose conduct is believed to be in violation of the Code that the Code has been violated. Each member of the ESADE MBA community, as a person of integrity, has a personal obligation to adhere to this requirement, both on campus and when representing ESADE off campus.

Failure to comply with the more explicit guidelines set forth by the Programme's Rules and Regulations can also be considered as breach of the Honour Code.

Violations of this agreement will be governed by Programme Management which has the right to exercise any disciplinary action necessary to uphold the standards set forth herewith and in the Programme's Rules and Regulations.

Sahand — Esade (Universitat Ramon Llull)

INVESTMENTS

Course Overview Before Transformation

The Investments course mainly concentrated on traditional financial theories and quantitative models, with minimal real-world application or student-centered activities.

Design Thinking Integration Process

- Reframed assignments around user-centered investment goals.
- Students conducted empathy interviews with hypothetical investors to understand their needs and anxieties.
- Ideation sessions for personalized portfolio strategies.
- Embedded prototype testing of investment approaches through simulations.

Transformed Syllabus Structure

- Practical, user-centered challenges paired with theoretical financial knowledge.
- Projects involved building diversified portfolios for different investor personas.
- Emphasized iterative testing and adjustment based on user feedback.



Investment Design Thinking Cycle

New Learning Objectives and Key Activities

- Understand investor psychology and the user-centered investment process.
- Develop and prototype innovative investment strategies.
- Foster critical and reflective thinking in financial decision-making.

Challenges Encountered and Solutions Developed

Challenge

Difficulty in shifting from purely quantitative thinking to qualitative analysis.

Solution

Introduced structured empathy interviews and guided workshops on developing user personas early in the course.

Updated syllabus

Investments

Dr. Anna Bayona

MSc. Finance, 2023-2024

Equip students path technicad requireble to particle with specific outcome.

The aim of the course is to introduce students to financial economics and financial decisionmaking from the mind-set of a professional investor. A goal of the course is to equip students with the conceptual and technical tools that are necessary for more advanced courses on the MSc. in Finance. The topics covered are approached from theoretical and practical perspectives. The course will incorporate simulations of theoretical concepts using spreadsheets.

At the end of the course, students should be familiar with the basic concepts and tools that are necessary to analyse and take decisions in financial markets, especially in relation to asset allocation. This course provides a foundation for most of the subsequent subjects in the MSc in Finance, and for the relevant professional examinations.

Good quantitative skills are a prerequisite for the course. I will assume that students have a basic knowledge of undergraduate mathematics and statistics, and basic knowledge of some economic and financial concepts (such as time value of money and the basic notions of risk and return). A working knowledge of spreadsheets or equivalent is also necessary.

2. Learning objectives and competencies

The course objectives are:

Learn how financial markets work, i.e., about investment alternatives, instruments, and financial market micro-structure.

Learn the main theories about how to allocate resources: relationship between risk and return, asset allocation, diversification, arbitrage, pricing of financial securities and market efficiency. It is also important that students can relate the main theories to empirical evidence.

Learn the basics about how to value financial assets, such as equity and fixed income securities.

Learn about applied portfolio management: portfolio performance evaluation, investment vehicles, investment policy and philosophy. Be able to apply the theory to real-world cases.

Expose participants to current and future challenges in the field of investments.

Students will also develop analytical, problem solving skills and learn how to structure financial decision problems in a logical and systematic way. The course multiple connect theoretical concepts with real-world applications. In addition, students will develop the necessary skills to work both independently and in teams. decision problems in a logical and systematic way. The course will enhance students' ability to

The challinge: portfulio to max

12 Sustainability 2- Stability 3-Higher risk- Ethown 4- Personal preferences

- Access data. statistics, risk-return calculations, Valuation

3. Course format and methodological approach

The course will include a combination of:

(1) LECTURES

These will present the concepts and theories that are the foundation of the course.

(2) QUIZZES

In some sessions there will be short quizzes during the classes to test that you have understood the main concepts of the lectures.

(3) ACTIVITIES IN THE CLASSROOM

There will be various classroom activities in which students are expected to actively participate. We will discuss topics, present new ideas, solve problems, conduct simulations, discuss articles, develop critical arguments, etc.

(4) TEAMWORK ACTIVITIES

These will consist of two cases and a portfolio building project. They will illustrate and apply a number of the concepts and theories discussed throughout the course and involve a substantial amount of autonomous work, both individually and as part of a team. You will be required to hand-in several documents with supporting evidence of your work. In addition, you may be requested to present your findings about the case in class.

(5) ONLINE SUPPORT CLASSES

There will be several online support classes where you will review main concepts and practice additional exercise and problems.

A learning area will be available in the intranet, where you will find the relevant course materials, communications, bibliography, etc.

A project is allocated to each team. The challenge is to create a portfolio with specific evaluation criteria. There are 5 deliverables. At dat ..., gov should provide the historical data that is requested in Table ... for all the assets indicated in it. At date-, you are all required to deliver the common portfolio that is defined similarly for creations, and all required to deliver the common portfolio that is defined similarly for creations of indicated report its performance. At dat... you are required to deliver your team portfolio (with contained goes for each grap) and its performance based on the simulated market performance in the future. I 3 is performance is the future.

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Steps: 1) Get familier with the basics of Financial market, how they cousk, factors affecting it, participants 1) what are the assets anniable to investors? How they are valued? where to find date? Statistics 3) what is a portfolio? Portfolio theory. Portfolio evaluation. Benchmarks 4) How to event a portfolio with specific stratezz 5) Track performance. Change the holdings.

The following table describes the sessions, topics, and assignments for each of the sessions in detail. Evaluated activities are listed in the session when they are due (see section 5 for details).

Sessions	Topics	Evaluated Activities
Session 1	Macroeconomic and microeconomic foundations of investments. The investment environment	
Session 2*	Measuring return and risk , A	SSOTO
Session 3*	Portfolio theory	Delivorable 2
Session 4*	Asset pricing models	Quiz on portfolio theory
Session 5*	Equity securities	*Case report and discussion
Session 6	The efficient market hypothesis & behavioural finance	Delixerable 2
Session 7*	Fixed income securities	
Session 8	International portfolio diversification and currencies	Quiz on fixed income securities
Session 9	Applied portfolio management and the future of investments	Final project: portfolio presentation
Session 10	Final exam	

Notes: You might need to use your laptop in several of the sessions

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marked with an asterisk (*). For the other sessions, a calculator is sufficient.

5. Assessment

The **assessment breakdown** which is used to calculate the final grade and the due dates are as follows:

Assessment /Deliverable	Dates	% of Final Grade
Class participation	Each class and on online forums	10%
Quizzes	2 quizzes – each worth 5% - on sessions 4 and 8.	10%
Team Assignments	 A case report - worth 10% due on the 23rd of October 2023 at 11.50 p.m. Portfolio presentation (10%) and report hand-in (10%). The report and presentation are due on the 27th of November 2023 at 11.50pm 	30%
Exam	21 st of December 2023	50%

Participating in class is important since you are sharing your knowledge, opinions and views with the rest of the participants. Participation will take into account your contribution in the session. A good contribution to class participation will benefit the whole class and not just the student who speaks. Listening is also an essential component of learning. The class participation grade will be "standarised" in relation to the other students in the class. Students may also participate using the **online discussion forums**, which are available for each of the topics of the course. The purpose of these forums is to foster class participation in a written form. Here, we present some rules for the forums so that your contribution can be counted towards the class participation grade. Your post has to be on the relevant topic for the session, insightful and thoughtful, original, well- written, brief, interesting and relevant for the other course participants, respectful to others. Your contribution will only count if we belief that it satisfies the previous criteria. Professors are not going to actively participate in the forums since this is a space for you to share your thoughts with your peers. Specific content or organization questions should be directed to us directly by email or in class. The participation grade is non-appealable since it is based on the professor's judgement.

The **quizzes** will be short tests which need to be taken online *during* the on-site class. Students that do not take the test during the scheduled time will *not* have the chance to re-take it on a different date and their grade on the quizz will be a 0.

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The **team assignments** comprise three components1:

The case report require individual preparation followed by a team discussion. Teams will be formed at the beginning of the course by the program management. The team as a whole should prepare a report of no more than 2000 words. The case reports should be delivered through the intranet on the due date and time. The case will be distributed approximately two weeks before delivery and the case questions one week before the due date.

The portfolio project report and presentation will be based on a project that students will work throughout the course. Teams will be required to create a portfolio given some pre-specified objectives and present it in front of potential investors. Teams will be asked to prepare a report and a presentation, which will involve a careful discussion on the investment process, assumptions, decisions taken, performance, and limitations. Teams have to hand-in their reports beforehand and will subsequently have to present the work during the last class of the course.

For the team assignments, there will be a peer evaluation which will influence the 30% grade that corresponds to team assignments. Details of the peer evaluation will be given later in the course.

The **final individual exam** will be a combination of various types of questions, both quantitative and qualitative, closed-book, with a formula sheet and calculator.

The two types of evaluation are as follows:

ORDINARY EVALUATION.

A minimum score of 5 is required both in the final exam and in the average (applying the weights mentioned above) in order to pass the course. The grading criteria can be summarised as follows: if both the final exam grade and the overall average grade are above 5 then the final grade is the average grade. Otherwise, the final grade is the minimum of the final exam grade and the overall average grade.

RETAKE.

If a retake exam is needed (only in cases where the student failed the ordinary evaluation), the final course grade will be determined by:

-In case the student received an APZ (it means that the previous exam was postponed but justified by medical or family-related reason and approved by Program Management), the original breakdown will be maintained.

-In case the student received an NP (it counts 0; not justified absence in the previous exam) or FAIL, the retake will count 100% as the final grade of the course.

COURSE POLICIES

The course follows the MSc Programmes in Management Class of 2023-2024 Regulations. Please read carefully the sections regarding academic integrity, punctuality, disabilities, withdrawal and leaves of absence from the MSc Programmes in Management, and grading system. If you use case solutions from previous years, it would not only harm your learning process but would be considered as a serious violation of the Honour Code and will carry the corresponding disciplinary measures (among them: course failure). The same would happen if you know that someone has done it and you don't inform us. All submissions go through a process of plagiarism detection.

Electronic devices, such as phones and laptops, should be turned off before the start of each class unless they are required for academic purposes.

¹ It is expected that each group member contributes fairly to team work for Investments. If a free rider is detected, the team assignment for this student/s will be adjusted accordingly.

6. Materials

LECTURE NOTES (AVAILABLE THROUGH MOODLE).

Reference books (a few copies are available at ESADE's library).

There are no required textbooks for the course. However, some of the following references cover some of the material that I will lecture:

Bodie, Z., Kane, A., and Marcus, A.J. (2023), *Investments*, 13th Edition, McGraw-Hill Education.

(Note: This book tends to get updated regularly. However, I believe any of the last few editions will be adequate).

ADDITIONAL BIBLIOGRAPHY

Brown, K.C.& Reilly, F.K. (2012), Analysis of investments and management of portfolios, 10th international edition, South-Western Gengage Learning.

Edwin, J.E., Gruber, M.J., Brown S.J., and Goetzmann, W.N., (2014), Modern Portfolio Theory and Investment Analysis, 9th Edition, Wiley.

Haugen, R.A. (2001), *Modern Investment Theory*, 5th Edition, Prentice Hall. Mayo, H. B. (2011), *Introduction to Investments*, 10th edition, South-Western.

Smart, S.B., Gitman, L.J., Joehnk, M.D., (2017), *Fundamentals of Investing*, 13th global edition, Pearson.

Sharpe, W. F. (2011). Investors and markets: portfolio choices, asset prices, and investment advice. Princeton University Press.

Note: Specific literature (both articles and/or books) could be recommended for each topic if required.

CASE AND READINGS BEFORE CLASS. THESE WILL BE POSTED ON THE INTRANET. Calculator

You will need a calculator for this course. A financial calculator is an advantage but not a requirement.

Rita — Esade XFEL (Universitat Ramon Llull)

Leveraging EuXFEL to Enhance Sustainability in Aerospace

Course Overview Before Transformation

The course initially emphasized technical aspects of the European XFEL (X-ray Free Electron Laser) and its applications in aerospace research, focusing on theoretical understanding without direct application to sustainability challenges.

Design Thinking Integration Process

- Redefined the course to address sustainability issues in aerospace using XFEL-based research.
- Students engaged in real-world challenge framing related to sustainable aerospace innovation.
- Integrated stakeholder analysis, ideation workshops, and early prototyping activities.

Transformed Syllabus Structure

- Challenges based on real aerospace sustainability problems linked to XFEL applications.
- DT phases (Empathize, Define, Ideate, Prototype, Test) explicitly embedded into the course flow.
- Use of interdisciplinary project teams working on innovation cases.



Emphaty Map for Science Communication Audiences

New Learning Objectives and Key Activities

- Understand the role of advanced scientific infrastructure (like EuXFEL) in addressing global challenges.
- Apply user-centered design principles to sustainability innovations in aerospace.
- Develop critical thinking, creativity, and communication skills.

Challenges Encountered and Solutions Developed

Challenge

Students initially struggled to link abstract XFEL technology with concrete sustainability challenges.

Solution

Provided real-world case studies and facilitated guided brainstorming to contextualize scientific concepts.

Updated syllabus

Workshop: Leveraging EuXFEL to Enhance Sustainability in Aerospace

PURPOSE OF ATTENDING THE COURSE

As a professional working in a large research infrastructure (European XFEL, <u>website:</u> <u>www.xfel.eu</u>), I am participating in this course to learn the Problem-Based Learning (PBL) method. My objective is to incorporate PBL into events designed to disseminate the activities carried out at our facility. These events will serve to:

- Communicate our mission and impact effectively.
- Attract new talent to our infrastructure.

In parallel, by involving our scientific and engineering staff in these initiatives, we aim to:

- Increase their awareness of the innovative aspects of their work.
- Create a virtuous cycle that further enhances innovation within our facility.

Envisioned PBL Course

TARGET AUDIENCE:

• 16 master students- divided into 4 teams

LEARNING OUTCOMES:

- 1. Develop a strong understanding of European XFEL (EuXFEL) technology.
- 2. Explore alternative applications of EuXFEL technology outside its core research areas.
- 3. Tackle real-world sustainability challenges using advanced scientific methodologies.

CENTRAL PROBLEM STATEMENT:

How can EuXFEL contribute to building a more eco-friendly airplane?

Students will research and analyze the potential of EuXFEL to enhance sustainability in the aerospace sector.

EXPLORATION CONTEXTS FOR TEAMS

Each team will work on a specific context to explore how EuXFEL's capabilities can address sustainability challenges:

- 1. ADVANCING MATERIAL RESISTANCE IN AIRPLANE ENGINES AND COMPONENTS:
 - \circ $\;$ Develop materials that are more durable and resistant to wear and tear.
 - Design lighter materials to reduce fuel consumption and lower the carbon footprint.

- 2. Investigating Materials Under Operando Conditions:
 - Analyze the behavior of materials under operational stress to enhance durability and sustainability.
- 3. IMPROVING RECYCLING PROCESSES:
 - Develop advanced recycling techniques to minimize the environmental impact of aerospace materials.
- 4. IMPROVING ENGINE EFFICIENCY AND EXPLORING ALTERNATIVE ENERGY SOURCES:
 - Enhance engine efficiency through optimized fluid dynamics.
 - Investigate innovative carburants and alternative energy sources to reduce emissions.

EUXFEL'S UNIQUE CAPABILITIES FOR SUSTAINABILITY CHALLENGES

EuXFEL offers several unique advantages for addressing sustainability in aerospace:

- 1. **Femtosecond X-Ray Pulse Duration:** Enables the detailed study of ultrafast processes, such as stress-induced changes in materials.
- 2. Ability to See Through Opaque Materials: Facilitates non-destructive testing and analysis.
- 3. Megahertz Repetition Rate: Provides high-throughput data collection for rapid innovation.
- 4. Sensitivity to Electron and Atomic Structures: Allows for precise structural analysis at atomic scales.
- 5. Wide Spatial Range for Investigation (Å to mm): Bridges atomic-level insights with macroscopic material performance.
- 6. Wide Temporal Range (Femtoseconds to Hours): Enables the study of material behavior over short and long timeframes.

SKILLS AND KNOWLEDGE FOR PARTICIPANTS

Participants will develop expertise in the following areas:

- 1. Advanced X-Ray Techniques: Proficiency in using X-ray methodologies for in-depth material analysis.
- 2. **Sustainable Material Recycling:** Understanding of eco-friendly recycling technologies and their applications.
- 3. Materials Response Under Stress Conditions: Insights into material performance and failure modes under operational conditions.
- 4. **Engine Dynamics:** A comprehensive understanding of fluid dynamics, engine performance, and the role of materials in improving efficiency.

WORKSHOP AGENDA

DAY 1: INTRODUCTION TO EUXFEL AND PROBLEM-BASED LEARNING (PBL) TOPICS:

- Workshop goals: Linking EuXFEL's capabilities with aerospace sustainability challenges.
- Introduction to the Central Problem Statement: *How can EuXFEL contribute to building a more sustainable airplane*?
- Overview of PBL methodology: Principles, applications, and benefits.
- Group formation and role assignments.
- Overview of EuXFEL Technology: Key features and how they can address sustainability challenges.

• Introduction to Sustainability in Aerospace: Challenges and opportunities in the sector.

DAY 2: APPLYING EUXFEL TO SUSTAINABILITY CHALLENGES ACTIVITIES:

- Teams explore their assigned contexts, with access to EuXFEL staff for guidance.
- Collaborative brainstorming and problem analysis.
- Research and idea development.

DAY 3: PRESENTATIONS AND FEEDBACK ACTIVITIES:

- Teams finalize and present their solutions to the class.
- Feedback and discussion with facilitators and peers.
- Workshop wrap-up:
 - Recap of key takeaways.
 - Reflection on how participants can apply the workshop's learnings to future research and careers.

LEARNING OUTCOMES

By the end of this workshop, participants will:

- 1. Understand the unique capabilities of EuXFEL and their relevance to solving sustainability challenges in aerospace.
- 2. Develop creative and practical solutions to enhance sustainability in the aerospace sector.
- 3. Gain hands-on experience with the PBL methodology, equipping them to tackle complex, interdisciplinary problems effectively.

Albert - IQS (Universitat Ramon Llull)

Information Systems

Course Overview Before Transformation

The course traditionally focused on systems architecture, database design, and enterprise resource planning, taught primarily through lectures and theoretical assignments without iterative project-based activities.

Design Thinking Integration Process

- Introduced human-centered problem-solving related to information system users' real needs.
- Students engaged in empathy research (interviews, observations) to uncover real system usability issues.
- Developed and tested low-fidelity system prototypes.

Transformed Syllabus Structure

- Projects structured according to the DT phases, from user research to final testing.
- Emphasis on developing user-friendly and needs-driven information systems.
- Reflective diaries and milestone presentations included to foster continuous improvement.



New Learning Objectives and Key Activities

- Apply Design Thinking methodology to information systems development.
- Gain experience in user research, rapid prototyping, and testing.

Develop critical digital and soft skills essential for future IT professionals.

Challenges Encountered and Solutions Developed

Challenge

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in shifting from system-centric to user-centric thinking.

Solution

Early-stage user journey mapping and persona creation exercises helped students internalize the importance of user needs.

Updated syllabus



Academic year: 2024/2025

53153 (PLAN 87)-Information Systems

INFORMATION ON THE TEACHING PLAN

Number of ECTS credits: 6
Duration:
Language/s:
Theory: Group 1:
Spanish Group
2: Spanish
Group 3: English
SEMESTER/S: 6
Type: Mandatory.
Teachers: Sílvia and Albert
GENERAL CHARACTERISTICS DESCRIPTION

BRIEF DESCRIPTION AND JUSTIFICATION

The subject aims to show the strategic importance of Information Systems, as well as the fundamental role they have in the management of organizations. Information is a strategic asset and today's companies need professionals capable of integrating the knowledge provided by the organization itself into business processes and the strategic decisions that are made. To this end, the subject offers on the one hand a theoretical vision in which information systems are presented in general, as well as specifically in relation to specific purposes and competitive advantages. On the other hand, students have the opportunity to use tools that contribute to the improvement of decision-

making processes.

COMPETENCES

CG1 - Recognize the main aspects of the different areas of the business world: economics, finance and accounting, human resources, business management and marketing, as well as others of a more general nature such as mathematics, oral and written communication, English, ethics and computer science.

CG2 - Apply the knowledge acquired to practical situations.

CB3 - Students must have the ability to gather and interpret relevant data (usually within their area of study) in order to make judgments that include reflection on relevant social, scientific or ethical issues

CB5 - Students must have developed those learning skills necessary to undertake further studies with a high degree of autonomy

CT3 - Analysis and Synthesis: Distinguish and separate the parts of a whole until their principles and elements are known; as well as integrating information or ideas so that a global vision can be formulated.

CT11 - Ability to use Information and Communication Technologies: Use information and communication technologies in the management of organizations.

CT12 - Industrial and Technological Readiness: Recognize and work in technological and industrial environments.

CE9 - Recognise the importance and effective use of information technologies in the business environment.

Prerequisites

The competencies of the previous educational stages.

CONTENTS

The contents of the subject are organized and developed in two blocks simultaneously. On the one hand, the first block aims to present and develop the strategic role of information systems from a conceptual perspective. For its part, the second block is presented as an opportunity for students to discover and learn tools that, based on the data managed with information systems, offer support in decision-making.

BLOCK 1 - THEORY

1. Strategic importance of technology in the business.

- The importance of information and communication technologies (ICT) in organizations.
- The role of information systems (IS) in the planning and development of business activity.

2. INFORMATION SYSTEMS IN BUSINESS

- Typologies of IS in organizations: Characteristics and examples.
- SI for individual use and equipment that facilitates communication between people.
- They DO support the operational part of the business.
- Integrated IS: *Enterprise Resource Planning* (ERP), Customer Relationship and Management Systems (CRM), and Procurement and Logistics Systems (SCM)
- Examples of use of integrated Mercado systems such as SAP or *Microsoft Dynamics*.

3. CURRENT EVENTS AND TECHNOLOGICAL TRENDS IN ORGANIZATIONS

- Evolution of computers: Moore's Law.
- Types of computers and models used in companies.
- Hardware Management in Business Organizations.
- Databases and business intelligence analysis systems (*Business Intelligence, Datawarehouses*).
- Introduction to the concept of Big Data.

4. INFORMATION SYSTEMS MANAGEMENT

- Choice of Information Systems: Criteria and rules.
- Standards. The use value of IS and ICT standards and their correct choice. Cost and benefit of SIs.
- Management of IS projects. Brief explanation of the most important aspects and stages.
- Comparison of the two most popular methodologies in project management: Waterfall and Agile.

BLOCK 2 – PRACTICAL

5. Decision support tools

- Requirements and challenges in decision-making.
- Process design and implementation.
- Collection, organization and preparation of data sources.
- Integration of information to extract knowledge.

The content of the block 2 by means of a project delivered using the Design Thinking methodology. Information is described below.

METHODOLOGY

TRAINING ACTIVITIES:

Training activities	ECTS credits	Competences
Face-to-face sessions for the presentation of concepts and procedures	1.1	CG1, CB3, CB5, CT3, CT12, CE9
Practical face-to-face sessions (exercises, case resolution, debates, viewing of materials, etc.)	0.8	CG2, CB3, CB5, CT3, CT11
Preparation and presentation of work by the student	1	CG2, CB3, CB5, CT3, CT11
Seminars and tutorials	0.8	CT11, CG2, CB3
Personal Study Activities	2	CG1, CG2, CB3, CB5, CT3, CT11, CT12, CE9
Objective and competency assessment sessions	0.3	CG1, CG2, CB3, CT3, CT11
TOTAL	6	CG1, CB3, CB5, CT3, CT12, CE9

Explanation of the teaching methodology:

The didactic methodology used in the subject is based on the combination of different training activities. The face-to-face sessions combine theoretical exposition with exercises, problems and cases where students must apply the concepts explained. Some of the exercises can be corrected immediately in the classroom, while others are proposed as personal study activities.

Evaluation activities are periodically carried out so that students can become aware of their progress in the acquisition of the knowledge and skills of the subject. Some of these evaluations are carried out without prior notice, in order for students to keep the subject up to date (follow-up activities), but those that have greater weight in the final grade are carried out with advance notice. For personal study, the student should rely on the notes obtained in class, complementing them if necessary with the consultation of one of the recommended books that are available in the IQS library or in online format. Finally, students also carry out work in small groups during the semester.

Regarding the block 2, this part is delivered by means of the definition and deployment of a project using the Design Thinking methodology. Thus, students can learn how to use Microsoft PowerBI to gain insights from data under a real context problem. The information of the project is described below.

- **Aim**. Given an industrial, sector or social challenge, create a visual a interactive dashboard to support making decision process.
- **Project organization**. Project is organized in three iteratives which include scope definition, data collection and organization, KPIs implementation, data story presentation
- **Team's organization**. Teams between 3 and 4 students are defined. Teams will work in some sessions in class as well as out of regular sessions. All information will be collected in a private channel available on MsTeams where they will share their data and PowerBI project.
- **Project organization.** Project is organized as an iterative process organized in three main stages as the next table summarizes. For each stage, teams must do a set of activities to satisfy the expected milestones.

	Data Modeling	Creation of relevant statistics	Create a storytelling
Resources students will need to use to solve the challenge	A topic of an industry, sector or social issue where the impact of the ESG perspective is relevant	The previous data model	Previous dashboards

Project milestones, that will break the challenge into smaller, actionable tasks or milestones that align with the content areas	 Define the problem's scope Define the expected KPIs Identify relevant data sources to get those KPIs Create a data model using the data sources (construction) 	 Create KPIs from data moodle Create visual and interactive dashboards to dive into KPIs 	- Create a compelling data presentation where ESG issues are identified
Time frame for planned tasks	From week 1 to 4	From week 6 to 11	From week 12 to 13
Key points in the project where students will present their work and receive feedback from peers and instructors	Expected KPIsData model	- Visual and interactive dashboard	- ESG insights
Opportuni ties for students to revise their work based on feedback collected before moving on to the next milestone	- Students submit on week 3 rd to receive feedback so they can refine KPIs and data model	- Students submit on week 9 th to receive feedback about the usability and relevance of dashboards	- Students submit on week 13 th to receive feedback about the ESG insights
Points in the course where reflection will be a key component, encouraging students to think about their learning process, not just the final product.	 Students integrate feedback before starting the next stage (week 4) 	- Students integrate feedback before starting the next stage (week 10)	- Students integrate feedback in the final version

EVALUATION

EVALUATION METHODS

Evaluation system	Weighting	Transversal and specific
		competences
Continuous assessment tests	Block 1 - 20%	CG1, CG2, CB3, CB5, CT3,
	Block 2 - 20%	CT11, CT12, CE9
Activities carried out in class (exercises,	Block 1 - 10%,	CG1, CG2, CB3, CB5, CT3,
discussion of cases, debates, etc.)	Block 2 - 10%	CT11, CT12, CE9

Papers and presentations	Block 1 - 20%	CG1, CG2, CB3, CB5, CT3,
		CT11, CT12, CE9
Projects	Block 2 - 20%	CG1, CG2, CB3, CB5, CT3,
		CT11, CT12, CE9
Final Test	-	

Learning Outcomes

By the end of the course, the student should be able to:

- Identify the various functions of information systems in the enterprise and use them to improve business performance
- Recognize the basic information systems necessary for the management of the company, as well as distinguish their competitive advantages and usefulness in strategic planning.
- Use technological tools that contribute to the improvement of decision-making.

QUALIFICATION

In the first ordinary call (Indicative period between mid-May and June)

In relation to the **activities carried out in class**, they are carried out throughout the semester and their evaluation is the average of the grades of the activities grouped by each block (theory and practice). These activities can be individual or group depending on the activity and will be indicated when they are presented.

In relation to **the continuous assessment tests**, there are 3 activities grouped into: Chapter 1-2, Chapter 3-4 and Chapter 5. The evaluation tests are carried out on an individual basis.

In relation to **the works and presentations**, there are 2 activities grouped into: Chapter 1-2 and Chapter 3-

4. These works and presentations are carried out in groups.

In relation to the **projects**, a project linked to chapter 5 is carried out in a group, which is worked on both in class and autonomously by the group outside class.

To calculate the average of the **final grade**, it is necessary to obtain a grade >=5 in each of the three continuous assessment tests and in each of the two papers and presentations. Otherwise, the student will have to retake this activity (continuous assessment and/or work) individually on the date established in the calendar of the semester's exam period. In the event of obtaining a grade <5 again in any of the five activities mentioned above, the final grade of the subject will be the minimum grade of these activities.

In the second ordinary call (Indicative period between June and

July) This call allows the student to recover the following activities:

- Papers and presentations from block 1 (20%). The student carries out an individual work that encompasses chapters 1, 2, 3 and 4.
- Continuous assessment test for block 1 (20%). The student is evaluated in chapters 1, 2,

- 3 and 4 regardless of whether they had any of these passed.
- Continuous assessment test for block 2 (20%). The student is evaluated in chapter 5.

The marks obtained in relation to the activities carried out in class (20%) and the project (20%) are the same as those obtained in the first ordinary call of that academic year.

Extraordinary calls

When a student takes the extraordinary call, regardless of the modality, he or she has to reevaluate the entire subject since no grades are kept for any type of activity.

In the case of extraordinary calls in the class attendance modality, the student will follow the evaluation criteria of the ordinary calls mentioned above.

In the case of extraordinary exams in the exam rights modality, the evaluation consists of an exam that has 100% of the grade of the subject. This review is organized in two parts that include 50% chapters 1, 2, 3 and 4, as well as another 50% in relation to chapter 5.

ASSESSMENT OF COMPETENCES (TRANSVERSAL AND SPECIFIC)

By means of the assessment systems described in the corresponding section (see table Assessment methods), transversal and specific competences are assessed by carrying out the activities described above.

BIBLIOGRAPHY

ADDITIONAL BIBLIOGRAPHY

- Arnold, J. (2022). Learning Microsoft Power BI: Transforming Data Into Insights. O'Really.
- Bocij, P., Greasley, A., Hickie, S. (2018). Business Information Systems: Technology, Development and Management for the Modern Business, Pearson.
- Milligah, J. (2022) Learning Tableau 2022: Create effective data visualizations, build interactive visual analytics, and improve your data storytelling capabilities, 5th Edition, Packt
- Rainer, R. K., Cegielski, C. G. (2017). Introduction to Information Systems 3e, John Wiley & Sons.
- Russo, M., Ferrari, A. (2019) The Definitive Guide to DAX: Business intelligence for Microsoft Power BI, SQL Server Analysis Services, and Excel Second Edition (Business Skills), Microsoft Press.
- Tableau (2023) Student
- Resource
- Page, <u>https://community.tableau.com/s/students</u>

Andrea – Alma Mater Studiorum (Università di Bologna)

SUSTAINABILITY AND SOCIAL REPORTING

The course primarily focused on corporate social responsibility (CSR) reporting standards and sustainability metrics, relying heavily on theoretical lectures and case study analysis without experiential or user-centered approaches.

Design Thinking Integration Process

- Integrated a challenge-based approach centered on real sustainability reporting dilemmas.
- Students conducted empathy interviews with stakeholders (e.g., NGOs, communities).
- Iterative prototyping of new reporting formats addressing user and societal needs.

Transformed Syllabus Structure

- Course divided into DT phases: Empathize \rightarrow Define \rightarrow Ideate \rightarrow Prototype \rightarrow Test.
- Students collaborated in interdisciplinary teams to co-create innovative sustainability reports.



Sustainable Design Thinking Model

New Learning Objectives and Key Activities

- Understand the social impact of corporate reporting beyond compliance.
- Develop stakeholder-centered reporting models.
- Foster critical thinking, creativity, and collaboration in sustainability communication.

Challenges Encountered and Solutions Developed

Challenge

Students initially treated reporting as a static compliance exercise.

Solution

Immersion activities (stakeholder interviews, field visits) fostered a deeper understanding of real-world expectations and needs.

98579 - SUSTAINABILITY AND SOCIAL REPORTING

Academic Year 2024/2025 Credits: 8

SSD: SECS-P/07

Language: English

- I Part Course (Prof. Selena Aureli): from Sep 20, 2024 to Oct 23, 2024
- II Part Course (Prof. Andrea Caccialanza): from Nov 05, 2024 to Dec 11, 2024
- Online lessons updates: <u>HERE</u>
- Teaching resources on Virtuale: HERE
- Updates of the current version are published on the course website: HERE

Learning outcomes and Challenge Statement.

Sustainability orientation of firms requires the development of new competencies and an investment on resources to increase firms' accountability with refers to non-financial dimension. This course aims to present social accounting and reporting tools for measuring the social, environmental and sustainable impact of companies on the environment. At the end of this course, students are able to identify and critically assess companies' commitment to sustainable development. In addition, students will be able to describe/use different accountability models. Those challenges will be discussed with the comprehension of current frameworks and experienced as discussed in teaching methods section. In particular, the development of competencies will be promoted according to working groups and assessment of real-case studies.

Course contents

The course content starts with the provision of key concepts and the theoretical basis necessary for understanding and implementing the concepts of corporate social responsibility, sustainability and its multifaced dimensions related to economic, social, environmental and ethical aspects.

Theoretical constructs and main theories on which the concept of sustainability is grounded will be analyzed (e.g. stakeholder theory, business ethics, humanistic management).

Institutional pressures and other factors that favor the adoption of sustainability by corporations will be investigated. Norms and soft regulations operating at the national and international level that foster sustainable development will be considered (the 2030 UN Agenda and its 17 Sustainable Development Goals, the European Action Plan, the European Taxonomy included in the EU Regulation 2020/825, the Non Financial Reporting directive 2014/95/EU and the CSR directive 2022/2464).

Concepts of sustainability and corporate social responsibility will be analyzed in the context of for profit, not for profit companies (e.g. third sector), private and public companies, as well as benefit corporations.

The second part of the course will focus on sustainability disclosure and reporting practices.

The main international accountability standards (e.g. GRI standard of the Global Reporting initiative, IIRC framework for integrated reporting, ESRS- European reporting standards as issued by EFRAG) and reporting tools (e.g. sustainability report, integrated report, non-financial declarations) will be analyzed and compared.

Readings/Bibliography

The text book for the class is:

Laine, M., Tregidga, H., & Unerman, J. (2021). *Sustainability accounting and accountability*. Routledge.

Teaching material (ppt slides and papers) will be provided by the teachers through VIRTUALE.

Additional suggested readings (books and articles) will be communicated during the first day of class

Teaching methods

- Traditional class lectures
- Flipped classrom where homeworks anticipated in class discussion (students encounter information before class through videos or readings to free up class time for activities that involve higher order thinking)
- Seminars (with the parcitipation of CSR and sustainability managers/officers) when possible
- Case-studies (lectures and critical evaluation)
- Working groups and discussions focused on specific themes
- Videos

Team work

- The second part of the course will engage students on a voluntary basis to the development of a working group that is part of the evaluation. Working groups of 3-4 students will be formed by the teacher on the basis of the availability of attending inperson students. Those groups will be published on virtuale by the teacher. The final goal of the project work will be the evaluation of the quality of sustainability reporting, according to the criteria that will be discussed in class and presented during lessons according the guidelines of sustainability reporting standards. Resources needed to complete this task will be published on Virtuale, as well as the sustainability reports that are required to be assessed. Accordingly further online materials can be consulted by students (i.e., official company website or secondary sources). The timeline for this activity is the following one: Lesson 3, the presentation of the criteria to evaluate the reports; Lesson 4, formation of groups and assignation of the cases to each group; Lesson 5-6, two weeks dedicated to the preparation of the PPT and Word file with the information required; Lesson 7, discussion of the preliminary analysis of the quality of the reports in class for each group and feedback on the working group (20 min for each group); Lesson 8, deadline to send the final version of the work; Lesson 9, presentation in class of the project work (PPT).
- Team work will allow team members to receive up to 3 points on the evaluation of the II part of the exam accordingly to: the quality and details of the analysis, the effectiveness of the presentations and timeliness in the respect of the deadlines.

Assessment methods

Students are assessed based on a written exam made by multiple choice questions and open questions. The written exam is computer based and organized in the Campus computer lab. The exam is designed to assess the knowledge of students and their ability to use the concepts to solve problems.

Students have to enrol to the exam through Almaesami (this is compulsory).

The final written exam will be held in a computer lab, in front of a pc. Students do not have to bring their laptop.

Students will pass the exam with a grade of at least 18 out of 30. The following structure indicates the range of possible grades:

- < 18: insufficient (not passed)
- 18-23: sufficient
- 24-27: good28-30: very good
- 30 cum laude: excellent

A different assessment method can be scheduled for attending students that will participate to in class activities

Teaching tools

- https://virtuale.unibo.it
- Possibility to use a MOOC: massive online open course on sustainability and integrated reporting

Federica — Alma Mater Studiorum (Università di Bologna)

CORPORATE COMMUNICATION

Course Overview Before Transformation

The course traditionally emphasized strategic communication models and media relations, approached through theoretical frameworks and case studies, with limited practical application.

Design Thinking Integration Process

- Students engaged in defining real-world communication challenges faced by companies.
- Applied user research (interviews, surveys) to identify communication gaps.
- Ideated creative, user-centered corporate communication strategies.

Transformed Syllabus Structure

- Sequential modules following DT stages: Research → Problem Definition → Ideation → Prototype Communication Campaigns → Testing and Refinement.
- Emphasis on co-creating communication solutions addressing specific audience needs.

New Learning Objectives and Key Activities

- Design audience-centered corporate communication strategies.
- Apply creative and critical thinking to communication challenges.
- Develop practical skills in campaign design, storytelling, and impact assessment.

Challenges Encountered and Solutions Developed

Challenge

Students found it hard to move beyond traditional "broadcast" communication models.

Solution

Workshops on empathy mapping and persona creation helped reframe communication strategies from the audience's perspective.

UNIVERSITY OF BOLOGNA CORPORATE COMMUNICATION PROF. FEDERICA

COURSE DESCRIPTION

The course focuses on understanding the theoretical foundations of digital communication with particular reference to the communication based on immersive technologies. A specific role will be dedicated to social media and methods of measuring digital communication. Particular space will be dedicated to the study, understanding and application of the sentiment analysis, which will be the core of the work to be carried out in groups (max five people).

COURSE CONTENT

Module 1: Foundations of Digital Communication

- Concepts and Definitions
- Differences Between Analog and Digital Communication
- Methods and Strategies of Digital Communication

MODULE 2: IMMERSIVE TECHNOLOGIES IN COMMUNICATION

- Digital Communication Through Immersive Technologies
- Augmented Reality (AR)
- Virtual Reality (VR)
- Mixed and Extended Reality (XR)
- Gamification in Digital Communication

Module 3: Design Thinking in Digital Communication

- Empathize:
 - Analysis of the communication landscape
 - Research on user needs and challenges in digital communication
- Define:
 - Identifying and framing the key communication challenges
- Ideate:
 - Brainstorming and exploring potential solutions for communication challenges
- Prototype:
 - Developing low-fidelity prototypes of immersive communication strategies
- Test:
 - Refining prototypes through feedback and iterative improvement

MODULE 4: SOCIAL MEDIA AND INFLUENCERS

• Digital Communication and Social Media

- Observations and trends
- Interviews with influencers to gather practical insights
- Designing and analyzing questionnaires
- Communication Through Influencers: Role and Impact MODULE 5: MEASURING DIGITAL COMMUNICATION
- Measurement Methods for Digital Communication
- Sentiment Analysis: Theory and Practice
 - o Individual analysis and group projects

MODULE 6: DIGITAL COMMUNICATION PLAN

- Creating a comprehensive digital communication strategy
- Final team presentations showcasing solutions to identified challenges

Teaching tools and methods

- **Case Studies:** Real-world examples from the business press and participants' personal experiences.
- **Design Thinking Workshops:** Interactive sessions to brainstorm and prototype solutions.
- **Group Work:** Collaborative projects to foster teamwork and creativity.
- Interactive Learning: Slides, discussions, and reflective activities made available to students.

Learning outcomes

By the end of the course, students will be able to:

- 1. Understand fundamental concepts of digital communication.
- 2. Employ design thinking principles to address communication challenges.
- 3. Utilize immersive technologies for innovative communication strategies.
- 4. Apply sentiment analysis techniques to analyze and improve communication.
- 5. Develop and present a comprehensive digital communication plan.

Readings/Bibliography

- The slides of the lessons will be available to students, necessary and instrumental to have a complete vision of the program.

- Scientific articles will be indicated for the part concerning communication and immersive technologies and gamification.

- Ceron, A., Curini, L., & Iacus, S. M. (2014). Social Media e Sentiment Analysis: L'evoluzione dei fenomeni sociali attraverso la Rete (Vol. 9). Springer Science & Business Media.

Assessment Methods

- ightarrow For Students Participating in Group Work
 - **Group Project:** Application of sentiment analysis and communication strategies to a case study. Groups (max 5 members) will present their findings and solutions.
 - Written Exam: Three open-ended questions testing:
 - Knowledge of theoretical concepts
 - Application and reasoning skills
 - Final Grade: Weighted average of group project (50%) and written exam (50%).

→ For Non-Attending Students

- Written Exam: Five open-ended questions focused on:
 - Understanding key concepts from the bibliography
 - Individual reasoning and application of concepts
- Final Grade: Based solely on the written exam.

Emanuele D. – Alma Mater Studiorum (Università di Bologna)

APPLIED BIOCHEMISTRY

Course Overview Before Transformation

The course focused heavily on theoretical aspects of biochemical processes and laboratory techniques, with limited opportunities for students to address real-world biochemical challenges through project-based activities.

Design Thinking Integration Process

- Students tackled real-world biochemical problems through Design Thinking phases.
- Conducted empathy interviews with "end users" of biochemistry innovations (e.g., healthcare practitioners, biotech companies).
- Developed low-fidelity prototypes for biochemical applications or solutions.

Transformed Syllabus Structure

- Full Design Thinking cycle applied: Empathize \rightarrow Define \rightarrow Ideate \rightarrow Prototype \rightarrow Test.
- Students worked in interdisciplinary teams to address biochemical challenges linked to health, environment, or industry.

New Learning Objectives and Key Activities

- Apply biochemical knowledge to create user-centered solutions.
- Foster innovation by developing, prototyping, and testing biochemical applications.
- Enhance critical thinking, collaboration, and problem-solving skills.

Challenges Encountered and Solutions Developed

Challenge

Students initially viewed biochemistry as purely laboratory-driven and abstract.

Solution

Real-life stakeholder interviews and user-focused problem definitions grounded their projects in real-world needs.

Updated syllabus

APPLIED BIOCHEMISTRY 6 ECTS (Master program in Biomedical Engineering)

Learning Outcomes

Attending this course Students will learn the general structure of nucleic acids and proteins, their significant cellular functions and the main protocols and technologies in use for their analysis in a wetlab.

Students should finally:

- understand relevant issues when working in a molecular biowetlab,

- proficiently communicate and interact with life scientists,

- suggest new, original and possibly unconventional, strategies for molecular diagnostics*.

* on the basis of voluntary participation in an experimental educational path

Course Contents

- Setting a research protocol: instruments and reagents in a biomedical laboratory.

- Setting a research protocol: cell cultures.

- Imaging and counting cells: principles of optical microscopy (bright field, phase contrast).

- Molecular components of a cell: aminoacids and proteins in solution.

- UV and visible spectroscopy to rapidly determine nucleic acid or protein concentrations.

- Resolving proteins in a mix: polyacrylamide gel electrophoresis (PAGE) of proteins, twodimensional electrophoresis of proteins.

- 2-D Fluorescence Difference Gel Electrophoresis (DIGE).

- Western blotting.

- Antibodies as laboratory reagents (mono- polyclonal immunoglobulins: sensitivity vs. specificity; species specificity.

- Antibody functionalization (immunoenzymatic assays, immunofluorescence assays).

- Signal processing in a biomedical laboratory: threshold, dynamic range, resolution, saturation,

reference systems.

- Enzyme Linked Immunosorbent Assay (ELISA).
- Molecular components of a cell: nucleotides and nucleic acids in solution.
- Flow of genetic information.
- DNA replication.
- Oligonucleotide probes in a biomedical laboratory how to design them.
- DNA sequencing.
- Southern blotting Restriction Fragment Length Polymorphism (RFLP).
- Polymerase Chain Reaction (PCR).
- Northern blotting and RT-PCR for.
- Real-time RT-PCR (qPCR Livak; primer efficiency; amplicon specificity).
- DNA microarrays to measure gene expression levels.

- Development of a Problem-Based approach to molecular diagnostics*

* on the basis of voluntary participation in an experimental educational path

Readings/Bibliography

The slides presented during the lectures will be available @ https://virtuale.unibo.it/

Wilson and Walker's principles and techniques of biochemistry and molecular biology

by Wilson, Keith | Walker, John M. | Hofmann, Andreas | Clokie, Samuel [2018 edition]. | Cambridge: Cambridge University Press, 2018.

ISBN 978-1-107-16227-3 Hardback

ISBN 978-1-316-61476-1 Paperback

is the textbook for this course.

Teaching Methods

Lectures in class.

Practicals in Lab Mol Cel Engn

Design Thinking approach to Problem-Based Learning*

* on the basis of voluntary participation in an experimental educational path

Assessment Methods

The final learning verification will be either:

- a written test (multiple choice questions, open questions and calculations - to be completed in a maximum of 60'), intended to restitute contents presented in class.

An organic vision of the topics addressed in class, the presence of a critical sense, the possession of clarity and expressive precision and specific language will be evaluated with marks of excellence.

Having studied but uncritically expressing the contents, communicating them in a non-specialist form will lead to proportionally less remunerative scores.

In case of learning gaps the exam will be considered failed.

* - a small-group work (~3 individuals) about the challenge of designing new robust, quicker and/or cheaper approaches to molecular diagnostics (e.g. label-free... point-of-care...) or repurposing present protocols for "off-label" applications. The project should deal with a technological solution of a diagnosis/therapy/research-related open need (at molecular/cellular level). The proposal should be conceived as if one was trying to attract financial resources from a funding body, presenting an idea and a project plan. This plan should contain (at least) the following sections 1) the open need to tackle, 2) the state-of-art in the field, 3) the goal of the project, 4) the materials and methods to implement the proposal,

5) the expected results/a prototype.

The outcome of the work will be presented in a workshop session where all the proponents of each project will take the floor to show their personal contribution in the collaborative work.

* on the basis of voluntary participation in an experimental educational path

Janusz — University of Information Technology and Management (Rzeszow)

Advanced network technologies

Course Overview Before Transformation

The course was traditionally centered on network architectures, protocols, and security frameworks, delivered through lectures and standard laboratory exercises without significant user-centered design elements.

Design Thinking Integration Process

- Introduced user research to understand challenges faced by real network users (e.g., SMEs, education institutions).
- Students applied DT phases to design more accessible, secure, and user-friendly network solutions.

Transformed Syllabus Structure

- Projects structured around real user needs, from empathizing with user groups to testing network prototypes.
- Focus on building solutions that address specific challenges like usability, accessibility, and resilience.

New Learning Objectives and Key Activities

- Design network solutions that are both technically sound and user-centered.
- Develop skills in stakeholder analysis, iterative prototyping, and user feedback integration.
- Encourage interdisciplinary teamwork combining technical and communication competencies.

Challenges Encountered and Solutions Developed

Challenge

Students initially focused solely on technical efficiency, ignoring user experience.

Solution

Workshops and guided exercises emphasized empathy and human-centered design principles in technology development.

Updated syllabus



UNIVERSITY of INFORMATION TECHNOLOGY and MANAGEMENT in Rzeszow, POLAND

1. BASIC INFORMATION ON THE COURSE

Course name	Advanced network technologies
Academic year	2022/2023
Faculty	Faculty of Information Technology
Field of study	Information Technology
Education level	Second-cycle – postgraduate
Education profile	Practical
Specialty	Cybersecurity

2. PREREQUISITES (resulting from the sequence of courses)

3. LEARNING OUTCOMES AND THE METHOD OF CARRYING OUT ACTIVITIES

3.1. Course learning outcomes - knowledge, skills and social competences,

No.	Description of the learning outcomes for the course On completing the course, the student has the following KNOWLEDGE, SKILLS AND SOCIAL COMPETENCES
P_W01	Can <u>characterize newdesign</u> solutions <u>for reliability</u> and <u>technologies usedscalability</u> <u>problems</u> in <u>scalable</u> computer networks
P_U01	Can apply protocolsexplore documentation for finding and evaluating scalability and reliability techniques for scaling networks based on different models and algorithms
P_U02	Can verify the effectiveness of the network scaling techniques and protocols usedCan solve practical problems by applying protocols and techniques for reliability improvements and scaling networks
P_U03	Can present and argue a methodology for verifying scalabilityCan verify the effectiveness of the reliability and network scaling techniques and protocols used
P_K01	Demonstrates willingness and openness to solve problems by consulting experts when necessaryskills in project base methodology

3.2. Forms of classes and number of hours and ECTS credits

Lec	Tutorial	RC	Lab	Р	eL	ECTS
-	-	-	30	20	-	4

3.3. Learning content (separately for each form of classes) **LABORATORY**

Learning content

Lab1	Testing redundancy using different versions of STP and EtherChannelChallenge statement, teams organization, tools introduction, technology pools for use overview: redundancy (STP, EtherChannel), network virtualization – VLAN technology, routing IPv4, IPv6 networks, network reliability using HSRP and VRRP protocols, scaling wireless networks, scaling IP routing
Lab2	Network virtualization – VLAN technology Design proposal be teams – expert consultation, constraints, choosing the best solution
Lab3	Routing in IP networks Presenting the prototype model – expert consultation, refinement

Lab4	Implementing scalable IPv6 networks Review of technology used by teams – exchanging knowledge, planning evaluation and testing phase
Lab5	Network reliability — study using HSRP and VRRP protocolsSolution presentation and discussion, delivering the final product (implementation)
Lab6	Scaling wireless networks
Lab7	Scaling IP routing

PROJECT

No.	Learning content
<u>P1</u>	Post lab 1 team's work – design brief (concept)
<u>P2</u>	Post lab 2 team's work - designing the model of solution
<u>P3</u>	Post lab 3 team's work – preparing the final solution
Р1 <u>Р4</u>	Establishing a research hypothesis in the field of Network Technologies. Planning the
	experiment – making assumptions, choosing the method and tools, dividing roles in the
	team. Preparation of tools, software or models and execution of the experiment.
	Analyzing the data and drawing conclusionsPost lab 4 team's work – conducting the test
	experiment and evaluation of the solution

3.4. Methods of verification of learning outcomes

Course outcome	Assessment method	Form of classes within which attaining the outcome is verified
P_U01	Practical taskIndividual student impact on team project evaluation (reflective diary, individual reflection)	Laboratory
P_W01 P_U02 P_U03 P_K01	ProjectTeamwork (final product)- group evaluation	Project

3.5. CRITERIA FOR GRADING THE LEVEL OF ACHIEVEMENT OF COURSE OUTCOMES

Course	For grade 2	For grade 3	For grade 4	For grade 5			
outcome	the student cannot	the student can	the student can	the student can			

P_W01U01 Characterize new solutions and technologies used in scalable computer networksexplore documentation for finding and evaluating scalability and reliability techniques		Characterize new solutions and technologies used in scalable computer networks as discussed in the lectureexplore documentation for finding and evaluating scalability and reliability techniques with major teacher support	Characterize in detail the new solutions and technologies used in scalable computer networks in the scope discussed in the lectureexplore documentation for finding and evaluating scalability and reliability techniques with minor teacher support	Characterize in detail the new solutions and technologies used in scalable computer networks beyond those discussed in the lectureexplore documentation for finding and evaluating scalability and reliability techniques without teacher support
P_ U01 W01	Apply protocols <u>design</u> solutions for reliability and techniques for scalingscalability problems in computer networks-based on	Apply network scaling protocols and techniques based on different models and algorithms making minor mistakes <u>design</u> solutions for reliability	Apply protocols and network scaling techniques based on different models and algorithms without making mistakes <u>design</u>	Apply network scaling protocols and techniques based on different models and algorithms without making mistakes
	different models and algorithms	and scalability problems in computer networksbasic solutions or major corrections are needed	solutions for reliability and scalability problems in computer networks average complexity solution or minor corrections are needed	and demonstrating proficiency in this areadesign solutions for reliability and scalability problems in computer networks — high complexity solutions or no correction are needed
P_U02	Verify the effectiveness of the network scaling techniques and protocols usedsolve practical problems by applying protocols and techniques for reliability improvements and scaling networks	Verify the effectiveness of the network scaling techniques and protocols used using simple techniquessolve practical problems by applying protocols and techniques for reliability improvements and scaling networks basic solutions or major corrections are needed	Verify the effectiveness of the techniques and protocols used to scale the network using more complex techniquessolve practical problems by applying protocols and techniques for reliability – average complexity solution or minor correction are needed improvements and scaling networks	Verify theeffectiveness ofcomplex networkscaling techniquesand protocolsusing morecomplextechniquessolvepractical problemsby applyingprotocols andtechniques forreliabilityimprovements andscaling networkshigh complexitysolutions or nocorrection areneeded
P_U03	Present nor argue methodologies for verifying	Present sufficiently and make the necessary arguments for the use of scalability verification methodologyverify the	Present to a good degree and give the main arguments for the use of scalability verification methodologyverify the effectiveness of the reliability and network	Present to a very good degree and give most of the arguments for the scalability verification methodologyverify the effectiveness

	scalabilityverify the effectiveness of the reliability and network scaling techniques and protocols used	effectiveness of the reliability and network scaling techniques and protocols used – basic tests are conducted	scaling techniques and protocols used — basic and advanced tests are conducted	of the reliability and network scaling techniques and protocols used automated tests are conducted
P_K01	Demonstrate a willingness and openness to solve problemsDemonstrate s skills in project base methodology	Show sufficient willingness and openness to solve problems by consulting with experts, if necessaryDemonstrates sufficient skills in project base methodology	Demonstrate significant willingness and openness to solve problems by consulting with experts when necessaryDemonstrat es good skills in project base methodology	Demonstrate a high degree of readiness and openness to solve problems by consulting with experts when necessaryDemons tr ates proficient skills in project base methodology

3.6. Literature

Obligatory literature

Bradley Edgeworth, Ramiro Garza Rios, CCNP and CCIE Enterprise Core ENCOR 350-401 Official Cert Guide, Ciscopress, Jan 3, 2020

Cisco Academy Resources: CCNP ENCOR http://cisco.netacad.net

Supplementary literature

I.B. Gertsbakh, Y. Shpungin: Models of Network Reliability. Analysis, Combinatorics, and Monte Carlo, CRC Press, 2009, or later.

Luis Miguel – Politécnico de Portalegre

Journalism and Communication

The course was originally focused on traditional journalism practices, media theories, and communication models, often taught through lectures and standard reporting assignments with limited experiential or user-centered projects.

Design Thinking Integration Process

- Introduced real-world media challenges requiring user research (e.g., how audiences consume and interact with news today).
- Students engaged in empathy interviews and audience analysis.
- Ideated and prototyped new journalism formats or communication strategies.

Transformed Syllabus Structure

- Full Design Thinking process integrated: Empathize \rightarrow Define \rightarrow Ideate \rightarrow Prototype \rightarrow Test.
- Students worked in teams to design communication products targeting specific audience needs.

New Learning Objectives and Key Activities

- Understand the evolving needs of media consumers.
- Apply creativity and innovation to journalistic and communication practices.
- Develop practical skills in user-centered content creation and media design.

Challenges Encountered and Solutions Developed

Challenge

Students initially focused on traditional, one-directional communication models.

Solution

Audience persona creation and iterative testing of content formats helped shift their mindset toward engagement-focused journalism.

Updated syllabus

Curricular Year /			2024/10/16								
Period	2024/25 / S1										
Course	Journalism and Communication										
Curricular Unit	Introduction	to Cinem	a and Film	n Analysis	: discour	se and n	arrative				
Language(s) of Instruction	Portuguese / English										
	ECTS	Total			v	Vorking	hours pe	r semest	er		
FOTO	6	60	Т	TP	PL	S	тс	E	0	ОТ	EC
(hours)			60	60	0	0	0	0	0	0	0
	T - Theoreti guidance; F Training und	cal; TP - ⁻ W - Field [,] der the Di	Theoretica work; T - T rective 77	II and pra Fraining; I /453/EEC	ctical; LF EC - Clin of June	 Labora ical teach 27, adap 	atory Prac ning; O* - oted by Dir	tice; S - S Other ho rective 20	Seminar; urs typifi 05/36/E	TG - Tuto ed as Clir C.	orial nical
Teacher in charge / Lecturing load								_			
[complete name, email, number of lecturing contact hours in the Curricular Unit]	Luís Miguel										
Other teachers / Lecturing Ioads	Luís Miguel										
[complete name, email, number of lecturing contact hours in the Curricular Unit]											
Prerequisites											
[Curricular Units that must precede and specific entry competences]											
Learning outcomes [Description of the overall and specific objectives] [Knowledge, skills and competences to be developed by students]	 To understand Cinema in its diachronic and synchronic variations; To know cinematographic movements and the individual contribution of filmmakers; Understand and apply the main concepts of Film Theory; To analyze Cinema as a complex phenomenon of meanings; Know the stages of writing a script; Understand the dynamics of the conception of a cinematographic narrative. It is intended that the trainee looks at Cinema in the synchronic and diachronic planes, combining the narratological, aesthetic and ideological aspects and the ability to shape in film the great concerns of Man combining reflection and concerns of the concer					ing the erns of					
Sustainable Development Goals	Méliès dicho Arts, its evo filmmakers the constru possibility of 4 QUALITY EDUCATION	btomy bet blution thro After a jo ction of a ofmaking a	ween doci ough cine burney thro script, fui a short filn	umentary matograp bugh the ndamenta n.	and fiction hic curre history of Il work fo	on, and re nts, mov f Cinema r the last	eadings ir ements, g , the train : objective	symbiosi roups and ee will lea of this co	is with Li d person arn the b burse: to	terature a lal itinerar asic conce provide th	nd other ies of epts for ne

Syllabus	 Film Studies: unity and diversity Aesthetics, ideology and narrative in Cinema Film analysis: perspectives and instrumental horizons Cinema in its diachronic and synchronic variations: The Lumière/Méliès dichotomy: genesis and dissidence German Expressionism; Influences and legacy Soviet cinema: theory, ideology and era Classic Hollywood cinema: narrative models, the Star System and Film Noir
	4.4. Classic Hollywood cinema: narrative models, the Star System and Film Noir4.5. Italian Neo-Realism: ideology and innovation4.6. The New Wave. Frontiers of the Experimental

	4.7. Auteur cinema: Bergman, Hitchcock, Kubrick, Kurosawa and Tarantino. Identity and disruptive discourse
	5. Screenwriting: from idea to planning. Preparation of a script
Evidence of the syllabus coherence with the Curricular Unit´s intended learning outcomes	It is intended that the trainee apprehends the problematics of Film Studies, understanding its plurality and unity, knowing key moments in the history of Cinema, between its synchronic and diachronic variations, in full conjugation between objectives and contents. The contents are combined with the objectives, leading the student to a questioning and critical reflection on a universe of framing, discourse, ideology,aesthetics and narrative, training and mobilization of resources and instruments of film analysis, as wellas creation in the area of screenwriting. Thinking and analyzing Cinema means, therefore, considering diachrony and synchrony, plurality and singularity, innovation, creativity and continuity, fragmentation and labyrinths, narrative, aesthetics and ideology. Students will apply filming, sound and editing techniques, select and use the most appropriate shots, and scriptwriting techniques and demonstrate flexibility, innovation and resilience while filming with time constraints.
	1 - Teaching methodologies
	The contents of the program will be taught through the combination of different methodologies that include the expository method, the inductive-deductive method, guided research, analysis and discussion of documents (printed texts, texts in digital format, websites, images, videos), with systematic use of the computer, the internet and film and with a project. Main focus points:
Teaching methodologies (including assessment) [Specify the types of assessment and the weights and evaluation criteria]	 In a Film Studies course, a real-world challenge could be selecting filming, sound and editing techniques, selecting and use the most appropriate shots, scriptwriting techniques and demonstrate flexibility, innovation and resilience while filming with time constraints.
	 The class has 20 students and it will be divided into 4 groups of 5 students, with one team leader each and dividing the main tasks using the Miro board and the resources:
	» selecting filming techniques
	» sound and editing techniques
	» scriptwriting techniques
	 Resources include computers, wifi connection, cameras, editing software, specialised webpages information about filming, sound and editing techniques, shot scale, scriptwriting techniques and the Miro board.
	 The most important milestones should be to enhance students's autonomous work capabilities, resilience, inovative thinking, creativity and flexibility, teamwork, and collaboration.
	• Time frame includes: set up, design brief, benchmarking, need-finding, solution- creation, prototyping and testing and project closing. while planning (pre-production), production and post-production (inside the classroom – 15h; outside the classroom – 40h).
	 Opportunities for students to revise their work are connected to all the workflow phases and final analysis of the product.
	 Reflection is a constant requirement along the process, namely during preparation, research, organization (pre-production) and scriptwriting and editing.
	 Final delivery and project closure include the script and the final film (deliveries) that will be presented and evaluated (individual evaluation: the process – 60% - and the deliveries – 40%)
	2 - Period assessment
	The evaluation will include an individual research work to be presented and debated in class. The work will be monitored by the teacher, from the conception phase to the final draft, always envisaging an interaction between the programmatic lines of the curricular unit and the interests of the students with regard to the themes to be investigated. The project will be evaluated on an individual basis, according to the process (60%) and the deliveries (the script and the film) (40%).

	3 - Examination assessment	
	Exam	
Evidence of the teaching methodologies coherence with the curricular unit?s intended learning outcomes	The different methodologies that include the expository method, the inductive-deductive method, the guided research, the analysis and discussion of documents (printed texts, texts in digital format, websites, images, videos), are associated with the objectives, namely the ability to reflect, investigate, problematize, produce, mobilize different information supports, manage different sources of information, know multiple contexts and theoretical frameworks, aesthetic and ideological issues and their respective languages.	
	1 - Main References	
References	 Branigan, E. & Buckland, W. (2013). The Routledge Encyclopedia of Film Theory. Routledge Carrière, JC & Bonitzer, P. (2016). O exercício do argumento. Texto e Grafia Comparato, D. (2004). Da Criação ao Guião. Pergaminho Gardies, R. (2007). Compreender o Cinema e as Imagens. Edições Texto e Grafia, Lda Hayward, S. (2023). Cinema Studies. The Key Concepts. Routledge Kawin, B. e Mast, G. (2010). A short History of Movies. Pearson Kolker, R. (2016). Film, Form and Culture. Londres: Routledge Marner, T. (2017) A Realização Cinematográfica. Edições 70 Mascarello, F. (org.). (2011). História do Cinema Mundial. Ed. Papirus Nelmes, J. (2012). Introduction to Film Studies. Londres: Routledge Stam, R. (2017). Film Theory: An Introduction. Blackwell Stone, R., Cooke, P., Dennison, S., Marlow-Mann, A. (2018), The Routledge Companion to World Cinema. Routledge Thompson, D. (2016). Como ver um Filme, Bertrand Editora Thompson, K. & Bordawell, D. (2018). Film History: An Introduction. McGraw-Hill Education 	
	2 - Complementary References	
	Cardoso, L. (2016) Literatura e Cinema: o Olhar de Jano. Vergílio Ferreira e o Espaço do Indizível. Edições 70 Griggs, Y. (2016) The Bloomsbury Introduction to Adaptation Studies. Bloomsbury Rowland, C. & Bértolo, J. (org.), A Escrita do Cinema: ensaios (2016) Documenta	
Special Situations	1 - Period assessment - Students with special status	
[Students with special status]	2 - Examination assessment - Students with special status	

Artur — Politécnico de Portalegre

Investment Project Preparation and Analysis

Course Overview Before Transformation

The course traditionally focused on the technical and financial evaluation of investment projects, applying static models and standard methodologies, without involving iterative, real-world-oriented project development.

Design Thinking Integration Process

- Integrated user-centered research by involving potential investors and project stakeholders in early stages.
- Students applied the Design Thinking process to redefine investment opportunities and assess feasibility iteratively.
- Encouraged ideation of innovative project concepts responding to community or sector-specific needs.

Transformed Syllabus Structure

- Project-based learning cycle aligned with DT stages: Empathize \rightarrow Define \rightarrow Ideate \rightarrow Prototype \rightarrow Test.
- Students developed real investment project proposals, incorporating feedback and multiple iterations.

New Learning Objectives and Key Activities

- Analyze investment opportunities considering user needs and broader societal impact.
- Foster creativity, critical analysis, and iterative refinement in preparing investment projects.
- Develop practical skills in feasibility analysis, stakeholder engagement, and project pitching.

Challenges Encountered and Solutions Developed

Challenge

Students initially approached projects mechanically, focusing only on financial returns.

Solution

Stakeholder mapping and early empathy interviews helped broaden their perspective to include user desirability, environmental impact, and social feasibility.

Updated syllabus

Model Course Unit Sheet - Curricular Unit Characterization:

Investment Project Preparation and Analysis

1. Duration

Semester 6

- 2. Working hours <u>140</u> 120
- 3. ECTS credits 5

4. Course title

Investment Project Preparation and Analysis

5. Learning objectives and their compatibility with the teaching method (knowledge, skills and competences to be developed by students)

Global challenge – elaborate and analyze an investment project in order to create a new socially responsible company (team work for with 4 or 5 elements)

Competences needed should include marketing analysis and planning, economic analysis, strategic formulation, financial analysis, operational and technical planning, human resources management.

Apply and understand the methodology for preparing and analyzing investment projects; Economically and financially plan the creation of a new company or the expansion of an existing one;

Economically evaluate projects; Evaluate the decision to finance projects

6. **Program contents**

1 Introduction;

- 1.1 Project concepts and their classification;
- 1.2 Investment concepts and their classification;
- 1.3 Justification of the investment project;

S1 Introduction and challenge presentation 1 Introduction;

1.1 Project concepts and their classification;

1.2 Investment concepts and their classification;

>> Mission1 Idea

2. Drawing up a project;

- 2.1 Market studies
- 2.2 Localization studies
- 2.3 Technical studies

2.4 Dimension studies;

- 2.5 Legal and financial framework studies;
- 2.6 Project implementation;

S2

1.3 Justification of the investment project; >> M2 PESTLE SWOT

3. Basic elements for project evaluation;
3.1 Investment and financing plans;
3.2 Operating plan;

S3

2. Drawing up a project;

- 2.1 Market studies
- 2.2 Localization studies
- >> M3 Market decisions

4. Evaluation of economic investment decisions;

- 4.1 Empirical methods;
- 4.2. Cash flow as a measure of project profitability;

4.3 Scientific methods;

- 4.4 Criteria for selecting mutually exclusive projects;
- 4.5. Analyzing projects under non-deterministic conditions;

S4

- 2.1 Technical studies
- 2.2 Dimension studies;
- 2.3 Legal and financial framework studies;
- 2.4 Project implementation;
- >> M4 LTD decisions

5. Evaluation of investment financing decisions;

- 5.1 The company's sources of finance;
- 5.2 Total cost of financing sources;
- 5.3-Net present value of the financing decision.

S5

- 3. Basic elements for project evaluation;
- 3.1 Investment and financing plans;
- 3.2 Operating plan;
- >> M5 Plans

S6

- 4. Evaluation of economic investment decisions;
 - 4.1 Empirical methods;
 - 4.2. Cash flow as a measure of project profitability;

4.3 Scientific methods;

- 4.4 Criteria for selecting mutually exclusive projects;
- 4.5. Analyzing projects under non-deterministic conditions;

>> M6 Economic Analysis

S7

5. Evaluation of investment financing decisions;

5.1 The company's sources of finance;

5.2 Total cost of financing sources;

5.3 Net present value of the financing decision.

>> M7 Economical and financial analysis # Final

deliverable

S7 ½ Final project presentation and evaluation

7. Demonstration of the consistency of the syllabus with the learning objectives of the curricular unit

Apply and understand the methodology for preparing and analyzing investment projects, taking into account the various stages that a project involves in terms of preparation, analysis and implementation.

Economically and financially plan the creation of a new company or the expansion of an existing one based on the various studies carried out and the financial forecasting instruments taught. Economically evaluate projects based on the evaluation criteria taught (NPV, IRR, Pay Back Period), taking into account the theory of the cost of capital and sensitivity analysis.

Evaluate project financing decisions, taking into account the financing mix, taxation and the cost of financing sources.

8. Teaching and learning methodologies specific to the course articulated with the pedagogical model

Theoretical framework sessions and presentation of demonstrative examples. Resolution of practical cases, case studies and simulation of situations. Monitoring the development of projects.

9. Assessment

Assessment by attendance: Individual written test (50%) and group application work (50%). Assessment by Exam: Written test weighted at 100%.

Students with Special Status - Assessment by attendance: foreign students are subject to the same training and assessment system. As for the rest of the students in special schemes, the necessary adaptations will be made in accordance with the regulations.

Students with Special Status - Assessment by examination: foreign students are subject to the same training and assessment system. For the rest of the students in special schemes, the necessary adaptations will be made in accordance with the regulations.

10. Demonstration of the consistency of the teaching and assessment methodologies with the learning objectives of the curricular unit

Theoretical framework sessions to explain the stages of preparing, analyzing and implementing an investment project. Presentation of demonstrative examples of project variants and specific cases from various sectors of economic activity. Resolution of practical cases, case studies and simulations on the various technical studies prior to project preparation, preparation of forecast financial statements, economic evaluation criteria, evaluation of financial decisions and simulations for sensitivity analyses. The student is accompanied in the preparation of the project.

Group and individual assessment is based on the development of a practical application project including all the steps set out in the syllabus for the implementation and analysis of an investment project. The degree of acquisition of the learning objectives is also assessed on an individual basis by means of an assessment test (by attendance) or written exam (in the case of a final exam).

Paulo Nuno - Politécnico de Portalegre

Information Systems

Course Overview Before Transformation

The course focused mainly on traditional marketing and advertising theories, models of consumer behavior, and strategic planning, often taught through lectures and static case studies, with limited emphasis on user-centered innovation or iterative development.

Design Thinking Integration Process

- Students worked on real-world marketing and advertising challenges based on user insights.
- Conducted empathy research with target audience segments to understand needs, motivations, and pain points.
- Iteratively developed and tested advertising strategies and marketing campaigns.

Transformed Syllabus Structure

- Full Design Thinking cycle embedded: Empathize \rightarrow Define \rightarrow Ideate \rightarrow Prototype \rightarrow Test.
- Students collaborated in interdisciplinary teams to co-create marketing solutions responsive to actual user behaviors and needs.

New Learning Objectives and Key Activities

- Design and implement user-centered marketing and advertising strategies.
- Apply critical thinking and creative problem-solving to marketing challenges.
- Enhance skills in empathy-driven research, rapid prototyping, and impact evaluation.

Challenges Encountered and Solutions Developed

Challenge

Students initially focused only on traditional marketing techniques without questioning user assumptions.

Solution

Introduced persona creation, journey mapping, and iterative campaign testing to foster deeper user understanding and innovation in communication strategies.

Updated syllabus

Advertising Workshop Plan

Curricular Year/	2024/2025
Year/ Period	<u>2°/3°</u>
Course	Advertising and Marketing Management
Teacher in charge	Paulo Nuno
Curricular Unit	Advertising Workshop
	Advertising
	1 Advertising integrated into the marketing process
	2. Creativity Invitation to a professional to informally present their professional activity and day-to-day challenges (World Cafe).
	 3. Objectives and budget of advertising campaigns Advertising campaigns 1. Carry out an advertising campaign 2. Devise a strategy 3. Make a middle plan Invitation to graduates to present the resources plan activity. (Seminar With Alumni) Assessment Invitation to companies to launch work so that students can work on real cases. (Present Real Problems in Companies).
Advertising Workshop Plan	

Assessment:

Class summary (Per class, one student presents a summary of the previous class) - weight in the final grade 10%

Campaign for the Self - The aim of the work of the Advertising Atelier "Campaign for the EU" is to present a proposal for an advertising campaign to the student himself. At a time when

starts looking for an internship/job, it is up to the marketing student to take a differentiated from other formations. This can be approached personally or in

professional skills but always with the creation of value in relation to the company's proposals competition. The work must contain a proposal and a thematic reflection that supports the options put into practice (Personal Course - Box Development). - weight in the final grade 50%

Final Work The group must see itself as a consultancy company and as such must The initial part of the work is to start by establishing yourself as such - Image, name, positioning, area of activity and differentiation from the competition. Must

identify the actors and their responsibilities within this company,

including identifying who is responsible for the consultancy and who occupies the other areas such as content producer, planner, analyst or any other area that is considered relevant.

The aim of carrying out this work is to create and plan in detail a

Marketing to be delivered to the company that the group (of 4 elements) selected for

present your proposal. (Present Real Problems in Companies). - weight in the final grade 40%

ANALYSIS OF SYLLABI AND CHANGES

The examples show various ways to integrate DT and PBL in STEM courses. Here are some key observations:

- **Problem-Solving and Critical Thinking:** Many syllabi emphasize these skills through practical activities.
- User-Centred Approach: Some syllabi focus on understanding user needs and creating real-world impact.
- **Teamwork and Collaboration**: All syllabi promote teamwork, which is essential for complex challenges.
- Flexibility and Adaptability: Some syllabi are flexible, adjusting activities based on student progress.
- Multidimensional Evaluation: Many syllabi use diverse evaluation methods beyond just exams.
- Integration of Digital Tools: Online platforms and tools are used to support collaboration and project management.



Top 5 Success Factors for DT Integration

Key enablers included structured milestones, team diversity, and consistent reflection opportunities. Challenges were mainly related to cultural shifts in teaching and learning approaches.

KEY POINT Real-world challenges enhance motivation, creativity, and the practical application of knowledge.

PRACTICAL RECOMMENDATIONS FOR PROFESSORS

Action Item	Тір
Start with a pilot	Test DT methods on a single module first
Prioritize balanced teams	Use student profiles for diverse team formation
Emphasize reflection	Integrate iterative learning cycles systematically
Provide clear structure	Scaffold with milestones and deliverable templates
Connect learning to real-world needs	Align challenges with societal or industry needs

- **TIP** Use diverse student profiles to form balanced, interdisciplinary teams.
- **TIP** Introduce low-risk creative exercises early to foster a safe environment for innovation.
- **TIP** Set up regular reflection checkpoints to embrace iteration and learning from failure.
- **TIP** Align course challenges with Sustainable Development Goals (SDGs) to boost engagement.

CONCLUSION

By integrating DT principles, professors created richer, more relevant, and dynamic learning environments that better equip students for today's complex world.

We invite all educators to explore these approaches, adapt them creatively, and continue reshaping the future of education.

Teach-BEASTs Teach to BE Aware STudents

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