PRE-ESTABLISED
PROJECT MANAGEMENT FOR STEM DISCIPLINES

Course contact hours: 45
Recommended credits: 6 ECTS – 3 US
Language: English

Prerequisites

None.

Objectives and Contextualization

Project management is of paramount importance for STEM (Science, Technology, Engineering, and Mathematics) fields as it ensures the efficient execution of complex projects. By applying systematic planning, resource allocation, and risk management, project management optimizes processes and enhances productivity. In STEM, where precision and innovation are vital, project management provides a structured approach to achieve goals and meet deadlines.

It fosters collaboration among interdisciplinary teams, improving communication and problem-solving skills. Moreover, project management allows for effective budgeting and resource utilization, ensuring projects remain on track and within constraints. Ultimately, project management empowers STEM professionals to deliver successful outcomes, driving progress and innovation in today's fast-paced and dynamic technological landscape.

Competences

This course aims to empower STEM students with the essential skills and knowledge required to manage projects efficiently, enabling them to thrive as successful professionals in their respective fields. By combining theoretical foundations, practical applications, and real-world challenges, students will emerge with the confidence and competence to excel in diverse STEM projects and contribute effectively to the ever-evolving world of science and technology. Some of these competences are:

1. Technical Proficiency and Analytical Thinking
2. Scientific Communication
3. Cross-disciplinary Collaboration
4. Innovation and Adaptability
5. Data Analysis and Interpretation
6. Ethical Considerations in STEM

Three main areas of project management will be explored:

A. Concepts and macro categories
B. Methodologies
C. Soft skills

A detailed explanation of each of them is provided in the Programme.

Learning Outcomes

Upon completing a course on project management for STEM students, learners can expect to achieve the following learning outcomes:

1. Analyse and Understand Theory: Gain a deep understanding of project management principles, concepts, and methodologies specific to STEM fields, enabling effective project planning and execution.
2. Define Effective Planning and Scheduling: Acquire the skills to create detailed project plans, including work breakdown structures, scheduling, and resource allocation, ensuring optimal time management and efficient use of resources.
3. Examine Problem-solving and Decision-making: Strengthen critical thinking abilities to address project-related challenges and make informed decisions that align with project goals.
4. Improve Resource Optimization: Master the art of resource management, ensuring optimal allocation and utilization of resources to meet project objectives without compromising quality or timelines.
5. Identify Risk Management: Learn to identify potential risks in STEM projects and develop strategies to mitigate them, minimizing project setbacks and enhancing overall project success.
6. Promote Team Collaboration and Leadership: Enhance teamwork and leadership abilities by understanding how to communicate effectively, resolve conflicts, and foster collaboration among diverse interdisciplinary teams.
7. Foster Adaptability and Agility: Explore agile project management principles, promoting adaptability and flexibility in responding to dynamic changes and uncertainties typical in STEM projects.
8. Communicate and Report in an effective way: Develop effective presentation and reporting skills to communicate project progress, outcomes, and challenges to stakeholders in clear and concise ways.
9. Consider Ethical Implications: Understand the ethical implications of project management decisions in STEM fields, ensuring responsible conduct and adherence to professional and industry standards.
10. Evaluate Project Outcomes: Learn how to conduct post-implementation evaluations of completed projects, extracting valuable insights for continuous improvement in future endeavours.

By attaining these learning outcomes, students will be equipped with essential project management skills that empower them to excel in their academic pursuits, succeed in their professional careers, and contribute effectively to the advancement of STEM fields through well-managed and successful projects.

Content

Week	Topics
1	Introduction to Project Management What is a project. Preliminary considerations and main parameters.
2	A. Concepts: 6 constraints and the iron triangle Time, cost, scope, and Quality Management
3	A. Concepts: Planning and Process Management KPIs and Measurement with a set of transversal parameters
4	A. Concepts: Risk Management **Project**. Presentation and Group Assignment
5	A. Concepts: Models and analysis tools
6	B. Methodologies: Waterfall and Agile (Scrum/Kanban). Analysis and comparison. **Project**. 1st intermediate check in.
7	Mid-term Exam B. Methodologies: Lean and Six Sigma
8	B. Methodologies: The DMAIC Approach: Define, Measure, Analyse, Improve and Control
9	B. Methodologies: overview of other approaches. Pros and cons **Project**. 2nd intermediate check in.
10	C. Skills: Problem solving and Troubleshooting
11	C. Skills: Communication and Leadership
12	**Project**. Final presentations.
13	C. Skills: Conflict and Negotiation. Techniques and practical examples C. Skills: Continuous (Un)learning and other skills
14	Final Exam

Methodology

The learning strategy includes a blending of theoretical lectures, case studies and in-class debates, collaborative projects, and individual exercises. Lectures provide a platform to explore theories, concepts, and analytical techniques related to project management strategy and tactics. Case analysis and discussions expose students to real-life decision-making scenarios across different industries and markets, enriching their theoretical understanding and fostering critical thinking skills. Collaborative projects enable hands-on experience in designing and planning project

management strategies, empowering students with practical expertise. This multifaceted approach ensures a comprehensive learning experience, preparing learners to tackle real-world challenges in the field of project management effectively.

Specific examples from disciplines related to Science, Technology, Engineering, and Mathematics will be used for in-class activities.

Activities

Directed:	
Class sessions (practice)	6 hours
Class sessions (theory)	27 hours
Assessment	4 hours
Supervised:	
Project	8 hours
Autonomous:	
Reading activities	20-30 hours
Background and research	20 hours
Offline project development	20 hours
Preparation of the presentation	20 hours

Assessment

The continuous assessment in this course will be based on the following elements:

- **Mid-term and Final Exams**: Mid-term and Final Exams: Both the mid-term and final exams will evaluate your thorough comprehension of the course material and concepts. These exams will encompass subjects covered throughout the course and evaluate your capacity to apply this knowledge in real-world contexts. Both exams will share the same format, combining multiple-choice and open-answer questions, and will encompass materials from weeks 1-6 and weeks 8-13, respectively. Detailed rubrics and explicit instructions will be provided accordingly.

- **Project**: The project will serve as a practical application of the skills and knowledge acquired during the course. Designed as a collaborative team effort, you will work on a project relevant to the course's subject matter, showcasing your proficiency in efficient project planning, execution, and presentation. The project will be introduced at the course's outset, with periodic assessments conducted throughout its duration. Supplementary instructions for project development will also be provided as part of your coursework.
- **Case Reviews**: Throughout the course, you will analyse and review real-world case studies related to the subject matter. These case reviews will help you apply the concepts to practical situations and enhance your problem-solving skills.
- **Exercises**: Regular exercises will be assigned to reinforce the understanding of key concepts and methodologies. These exercises will provide opportunities to practice and improve your skills in project management.

- **Participation:** Your engagement in in-class activities and attentiveness to the class's progress will be evaluated using agile and engaging methods during each class.

Each assessment element will contribute to your final grade, and together, they will provide a comprehensive evaluation of your progress and performance in the course.

Assessment Activities

Title	Weighting	Hours	Learning outcomes.
Mid-term exam	15%	1h40m	1, 2, 3, 4, 5
Final exam	20%	1h40m	1, 2, 3, 4, 5
Project	20%	3h-20h*	2, 3, 4, 5, 6, 7, 8, 10
Presentation	15%	30min-20h**	2, 3, 4, 5, 6, 7, 8, 10
Case reviews and exercises	10%	5h	1, 2, 4, 9, 10
Participation	20%		

*NOTE: 3h in-class, 20h homework.

**NOTE: 30min in-class, 20h homework.

Bibliography

Required reading:

1. Wysocki, Robert K. (2019): Effective Project Management: Traditional, Agile, Extreme, Hybrid, Wiley. Excerpts.
2. PMBOK Guide to the PROJECT MANAGEMENT BODY OF KNOWLEDGE. Excerpts. Comparing different editions.
3. Siegelaub, J. M. (2007). Six (yes six!) constraints: an enhanced model for project control. Paper presented at PMI® Global Congress 2007—North America, Atlanta, GA. Newtown Square, PA: Project Management Institute.
4. Brown, A. S. (2005). The charter: selling your project. Paper presented at PMI® Global Congress 2005—North America, Toronto, Ontario, Canada. Newtown Square, PA: Project Management Institute.
5. Reichel, C. W. (2006). Earned value management systems (EVMS): "you too can do earned value management" Paper presented at PMI® Global Congress 2006—North America, Seattle, WA. Newtown Square, PA: Project Management Institute.

Recommended reading:

1. Meredith, J. and Mantel, S., (2000). Project Management: A managerial Approach, J. Wiley & Sons New York. Excerpts.
2. Kerzner, Harold R. (2009). Project Management: A Systems Approach to Planning, Scheduling, and Controlling. 10th Edition. Excerpts.

3. Brown, A. S. (2003). Modelling tough scheduling problems with project management software. Paper presented at PMI® Global Congress 2003—North America, Baltimore, MD. Newtown Square, PA: Project Management Institute.
4. Barac, N. et al. (2010): LEAN PRODUCTION AND SIX SIGMA QUALITY IN LEAN SUPPLY CHAIN MANAGEMENT, Economics and Organization Vol. 7, No 3, pp. 319 - 334

Software

Comparing characteristics of software tools (Monday, Trello, JIRA among others).