

LEADING PROJECTS.

Institution of
**MECHANICAL
ENGINEERS**

World class process combined with superior
people management.





RAISE YOUR SKILLS IN TAKING THE LEAD

This suite of training courses will help improve your performance in all areas of project management and will help you find the balance between the tools required to keep your projects on track, and the interpersonal skills needed to keep your project team working together.

This portfolio also includes qualifications with APM Project Fundamentals and APM Project Management, as well as eLearning attendance options.

“““ A REALLY INTERESTING COURSE WITH PLENTY OF USEFUL HINTS, TIPS, EXAMPLES AND TECHNIQUES

Rueben Williams, AB Precision Poole Ltd
(Managing engineering projects)



WHY IMECHE

The Institution of Mechanical Engineers provides the most up-to-date, industry relevant training for engineers, offering a broad portfolio of technical, business and leadership courses to help professionals in technical organisations develop the skills they need to transform their careers.

Working with leading businesses and Universities, we create and share engineering knowledge and provide the government, business and the public with innovative, authoritative and impartial information.

This knowledge provides us with a greater understanding of the challenges facing engineers and businesses so that we can create training programmes applicable to engineers at all levels, leading to to improvements in performance in their workplace.

We can create and deliver a range of programmes that will consider your business objectives, culture and the experience levels of delegates.

In addition, we also offer performance diagnostic tools and coaching workshops for your business.

Our training programmes are specifically designed for the engineering community, to develop a wide range of vital skills that help you succeed in the workplace.

- We specialise in developing engineers – we have a long history of delivering technical and leadership training, tailored specifically for engineers
- Our courses support CPD – our training helps your engineers meet the standards required of professionals registered with the Engineering Council
- You can save on multiple bookings – use our Learning Pass when booking several training courses to make savings of up to 33% off the full price
- All of our courses can be tailored to your organisation and delivered in-house.

WHY PROJECTS GO ASTRAY - CASE STUDY

Whether they're late, over budget or failing to deliver on key objectives; there are a wide range of ways that engineering projects can go astray, and an equally wide range of underlying reasons that these shortcomings can occur.

Due to the complex and multi-faceted nature of engineering projects, a team could have all of the technical skills, resources and experience required to take on a task, but still fail due to problems such as unexpected challenges, team issues or individual error. A project manager must be flexible and dynamic to deal with these challenges, as well as having a strong team around them, able to overcome complications and mobilise behind overall project success.

Here, we've listed 7 of the most endemic reasons that projects go astray, as well as highlighting the best way to prepare for, adapt to and ultimately overcome these challenges. Alongside each, we've highlighted examples from one of the most highly-reported project management failures in recent years, that of the NASA Mars Climate Orbiter Mission (otherwise known as the "Mars Probe") of 1999.

This famous failure in unmanned space exploration occurred due to a small individual error in miscalculation, but was attributed above all to a lack of leadership. This led to the craft passing far too close to the red planet and being incinerated by the heat of its atmosphere.

1) FAILURE TO FOCUS ON KEY OBJECTIVES

Many projects go off course due to a failure of managers to ensure that every team member works with key objectives and deliverables in mind. Whilst it is important that individuals know their own role within a team, they must also keep a strong focus on how their actions will contribute to project success. Should they feel concerned about the project's outcomes, they should feel obliged to report these concerns.

A report from the Mars Climate Orbiter Mishap Investigation Board found that a key factor to the mission's failure was that managers "did not adequately instil a mission-success culture" within all team members. This meant that individuals didn't raise concerns that they had with the project's key objectives in mind, and significant risks went unreported.



2) FAILURE TO DETERMINE RESPONSIBILITY

Projects often fail because individuals are unable to understand or take ownership of their own responsibilities. This often occurs as a result of those leading the project delivering confusing or changing instructions to team members. When planning all projects, managers must ensure that roles and responsibilities are carefully delegated, and that they're clearly communicated to individuals.

The Mars Climate Orbiter Mishap Investigation Board reported following the failed mission that roles were not adequately defined, meaning that key responsibilities were often unclear. This meant that team members on occasion declined to report key problems, feeling that they were not responsible for their solution.



3) COMMUNICATION BREAKDOWNS

Communication breakdowns within a project can lead to misunderstandings of progress, roles and key issues, as well as important tasks failing to be properly integrated. Within smooth running projects, managers ensure that lines of communication are open in all directions, and that key developments are documented appropriately. This allows all key deliverables, feedback, developments and possible complications to be openly shared.

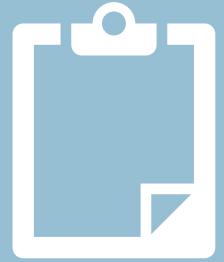
A lack of inter-team communication was a key feature of the Mars Probe's failure, meaning that necessary levels of cooperation became impossible. The lack of management in handover procedures meant that important information was often not accessible to those who could act upon it. Crucially, the disparity in measurements used by different teams (with one working in metric units and one in English units) was never identified or acted upon by project leaders.



4) INCOMPLETE PLANNING

Incomplete or erroneous planning can also mean the downfall of a project. Equipment available and budget must be planned from the outset, and schedules set using tools such as Gantt charts. What's more, contingency plans must exist as a backup in all cases. Additionally, risk management tools such as risk registers should identify possible problem areas, and thorough briefing should ensure that individuals understand plans for the project's completion.

Compounding issues in funding and staffing within the Mars Climate Orbiter mission, the Mishap Investigation Board also commented that "the project management team appeared more focused on meeting mission cost and schedule objectives and did not adequately focus on mission risk". Planning for mission success above all else would have avoided this short-sighted approach.



5) SKILLS SHORTAGES

If individuals within a project are not equipped with the skills needed to carry out their role, or teams within the project are short-staffed, it is very unlikely that tasks will be completed to the level of quality required. When planning every project, it is essential that a project manager has enough well-trained individuals to guarantee success.

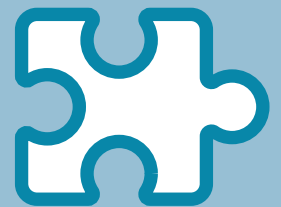
As well as being critically understaffed, the Mars Climate Orbiter Mission was carried out in part by individuals who were not sufficiently trained before the mission began. Compounding this, where inexperienced operatives were used, more senior specialists were not recruited to mentor and support them.



6) INSUFFICIENT PROCESSES

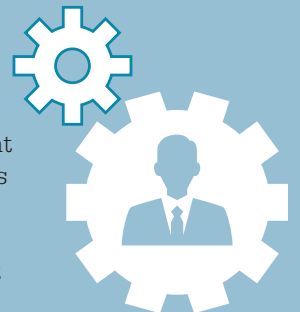
Failing to thoroughly organise the processes necessary for the success of a project can quickly lead to its failure. Engineering projects integrate a variety of complex processes; each of these must be fully planned in order to ensure a project is completed successfully. What's more, creating comprehensive contingency plans also minimises the risk of projects going astray.

Poorly designed processes were another key cause of the Mars Climate Orbiter project's failure. There was little discipline in processes used throughout the project's development and - in particular - the transition from development to operations was not made part of a comprehensive process. This meant that the root causes of the satellite's burnout went wholly unknown to those who could have prevented it.



7) LACK OF SUFFICIENTLY EFFECTIVE PROJECT GOVERNANCE

A lack of effective governance from senior managers can also lead to projects going astray, as they fail to aid leaders at necessary times during the organisation and implementation of their projects. Those governing a project will delegate responsibility for a project to the project manager, but they should also play a role in ensuring that the right projects are selected, and that these projects are well-managed. There will sometimes be conflicting demands between projects (for instance over use of scarce resources) which require input from them. A project manager needs to be able to escalate issues to their Project Sponsor or Project Review Board, receive clear direction from them, and obtain timely decisions on important things outside of the project managers remit.



If you want to update your project management expertise, the Leading Projects suite from IMechE offers a comprehensive range of project management courses to enhance your vocational skills and ensure that no projects you're involved in go astray.

Call our experienced training advisors and discuss your training needs on +44 (0)207 304 6907 or email us training@imeche.org

TOP 8 QUALITIES OF A GOOD PROJECT MANAGER

A competent engineering project manager balances available resources diligently to complete work on time, within budget constraints and to the level of quality required. Alongside this, they both earn and maintain the support of everyone working in their team, whilst ensuring they have the adequate understanding of project's key processes, objectives and deliverables.

Taking inspiration from George Washington Goethals, one of the most successful engineering managers of all time, we've listed 8 of the most important characteristics that make a project manager. Goethals combined traditional "hard" and "soft" skills to mobilise a huge workforce in the face of countless challenges to complete the Panama Canal in 1914, finishing the colossal undertaking with both money and time to spare.

1) ASSURES PROJECT OUTCOMES

A good manager has as a strong understanding of a project's broader deliverables, ensuring that they are focused on throughout and met upon completion. They will clearly define these objectives from the onset of a project, and set in place quality assurance procedures to guarantee delivery in every crucial area.

George Goethals' high standards often distanced himself from others in the Panama Canal project, but consistently earned him great respect from key stakeholders, as well as those working around him. Those involved knew what he expected, and that he had respect for those who worked hard.



2) ORGANISATION

Successful project managers organise their team and resources diligently, minimising the risk of unexpected complications hindering a project. Risk assessments and contingency plans are essential to this, as well as realistically calculating necessary time, budget and resources, including the size of team needed to complete the project.

When approaching the Panama Canal, a project crippled by poor organisation in its early years, Goethals took a holistic approach. He split the huge project into three more manageable ones, and created complex cost-keeping systems for all materials and jobs required to successfully complete the canal.



3) SUFFICIENT KNOW-HOW

Whilst there is no necessity for a project manager to be able to carry out the roles of specialists in their team, it is important that they understand the fundamental tasks expected of them. A good team manager delegates roles with a sound understanding of what is necessary for project completion, then shows faith in the abilities of each team member to carry out their role.

George Goethals' know-how was one of the key reasons he was assigned to the Panama Canal project. He had nearly three decades of experience and had worked on several similar, water-based projects. Alongside this, he also understood the importance of not micro-managing, left most of the engineering work to specialists, instead focusing on worker wellbeing and morale.



4) LEADERSHIP SKILLS

A good leader gets the very most out of everyone working around them, ensuring that morale is high, targets are met and individuals feel sufficiently challenged. Excellent interpersonal and team-building skills are essential to this, as well as a responsiveness to the needs of individuals within their team. In addition to this, a good project manager will feel a strong sense of responsibility for project success, and are able to mobilise disparate teams to this end.

George Goethals' leadership style was highly focused around the needs of those involved in the project - what he called the "human element". He spent time meeting individuals, ensuring they were motivated, and responding to their problems where he could. Combined with his meticulous planning and unbending sense of duty, this leadership style gained him respect from almost all working with him.



5) SKILLED IN COMMUNICATION

A good project manager can clearly communicate everything from roles and requirements, to project progress and changes of circumstance. They will also ensure that lines of communication remain open in all directions, creating an openness which instils confidence and minimises the risk of important elements going unnoticed. In order to guarantee that all communications are understood, using “playback” (where instructions are reiterated by those given them) can also improve project outcomes.

The communication mechanisms which George Goethals created within the Panama Canal project were amongst his greatest achievements. He set up a complaints board enabling workers to talk directly to him about their issues, meaning that all knew he cared for their concerns. He also distributed a newspaper to everyone working on the project, supporting inclusivity and positivity around the canal’s progress.



6) A KEEN PROBLEM SOLVER

It is rare for an entire engineering project to pass complication-free, meaning that the ability to deal with unexpected problems and conflict is an essential trait of a project manager. Whether they occur as a result of error, resource shortages or unexpected events, problems must be resolved at the source, and in a calm, reasoned and organised manner.

When George Goethals took on the Panama Canal project, he had several huge problems to overcome. Morale was low, killer diseases were ravaging workers and the project had earned a poor reputation due to its past failures. Despite these huge challenges, Goethals made use of his experience, organisation and interpersonal skills to complete the project around 23 million dollars under budget.



7) MANAGES TIME EFFECTIVELY

A successful project manager carefully allocates time necessary for different elements of a project, as well as monitoring progress and re-allocating time and resources if deadlines are set to be missed. An atmosphere of openness means that team members feel comfortable speaking to their project manager if they are concerned that their work may overrun.

The fact that the Panama Canal was opened an entire 6 months ahead of schedule is testament to Goethals’ time management skills. He employed over 40,000 people in order to meet the demands of the project on time, and his organisation of the canal’s build into smaller chunks meant that deadlines were more manageable.



8) RECOGNISES AND UTILISES SKILLS

A good project manager recognises the strengths of their team, delegating individuals to roles which match their skills with the needs of the task. Where inexperienced team-members are assigned, they will balance this with more seasoned specialists, ensuring work is completed to the standard of quality that’s expected. Additionally, good project managers will prepare for the future by developing inexperienced engineers whilst projects are underway, for example using mentoring and on-the-job training.

George Goethals was extremely careful when delegating senior positions within the Panama Canal project. Notably, he called upon experienced experts like Maj. David D. Gaillard to become involved in challenging management roles, as well as employing a huge number of Corps of Engineer officers for their organisation and experience.



If you are looking to improve your own project management skills, the IMechE Leading Projects suite offers a wide range of practical training options to enhance your capabilities. Equipping participants with practical skills and frameworks, these courses cover everything from specific disciplines like R&D project management and Agile project management, to more high-level PRINCE2 foundation and APM accredited training packages.

COURSE OVERVIEW

AGILE PROJECT MANAGEMENT

A 1-day course providing an introduction to the popular Agile approach for managing software projects, suitable for both project managers and developers.

PROJECT GOVERNANCE & SPONSORSHIP

A 1-day course to review the key responsibilities and attributes required to be a competent and effective Project Sponsor.

APM PROJECT FUNDAMENTALS QUALIFICATION

A foundation-level qualification for anyone who wants an overview of project management terminology and concepts, together with some practical techniques for managing projects. Includes a 1 hour multiple-choice format exam.

APM PROJECT MANAGEMENT QUALIFICATION

A comprehensive knowledge-based qualification that is recognised internationally. It is recommended that attendees have at least 2 years project management experience. A 5-day intensive course with 3 hour written exam paper on the final day.

MANAGING ENGINEERING PROJECTS

A course focussing on the tools and techniques for scoping, planning, managing risk, and delivering projects in an engineering environment. For aspiring or existing project managers.

WORKING AS PART OF A PROJECT TEAM

A 1-day course for members of project teams, enabling them to use project management tools and techniques to plan, monitor and deliver their project work effectively.

R&D PROJECT MANAGEMENT

A programme designed to support the innovation process and supports those managing R&D projects so that key success criteria are established and efficiently achieved.

LEADING YOUR PROJECT TEAM

A 1 day course for existing or aspiring project managers, with emphasis on the skills and techniques essential for achieving results via other people.

PRINCE2 FOUNDATION

A foundation, accredited course for you to demonstrate sufficient recall and understanding of the PRINCE2 project management method.

PROJECT PLANNING

A 1-day course covering the steps necessary to prepare a project schedule, including a practical case study.

PROJECT RISK MANAGEMENT

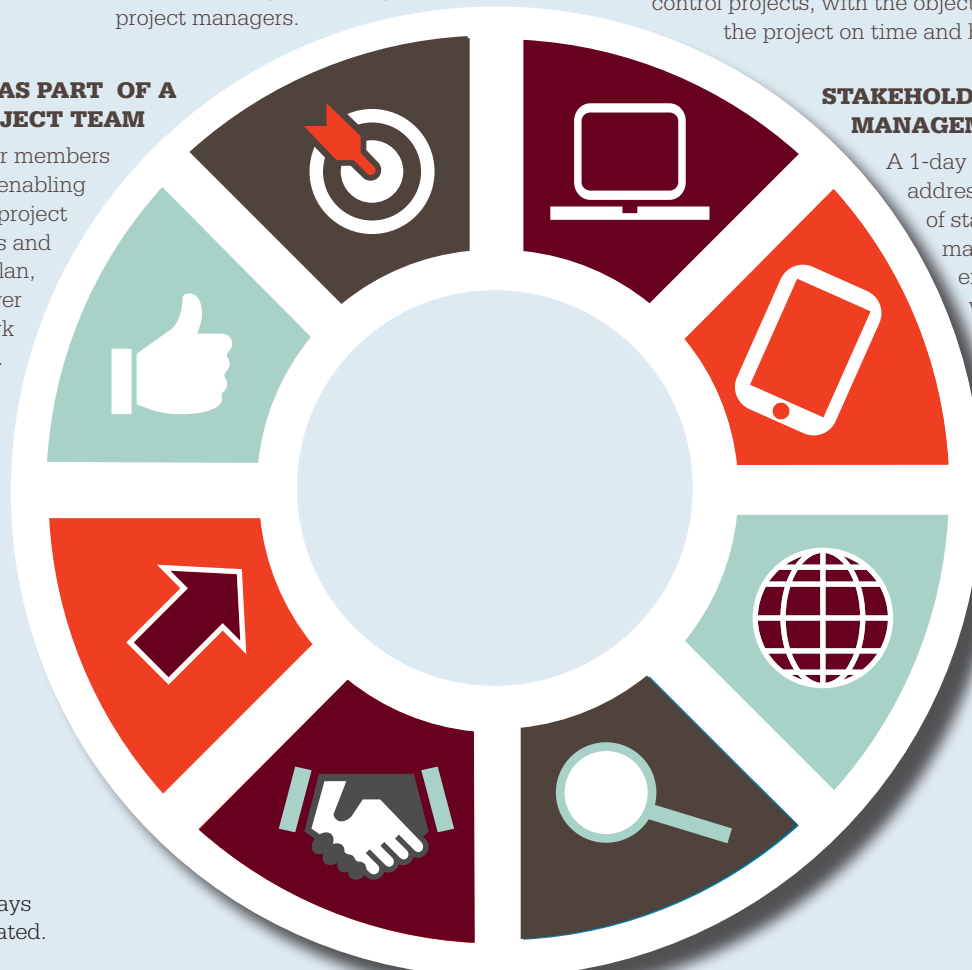
A 1-day course including both qualitative and quantitative risk management techniques.

PROJECT MONITORING & CONTROL

A 1-day course reviewing the processes used to monitor and control projects, with the objective of concluding the project on time and budget.

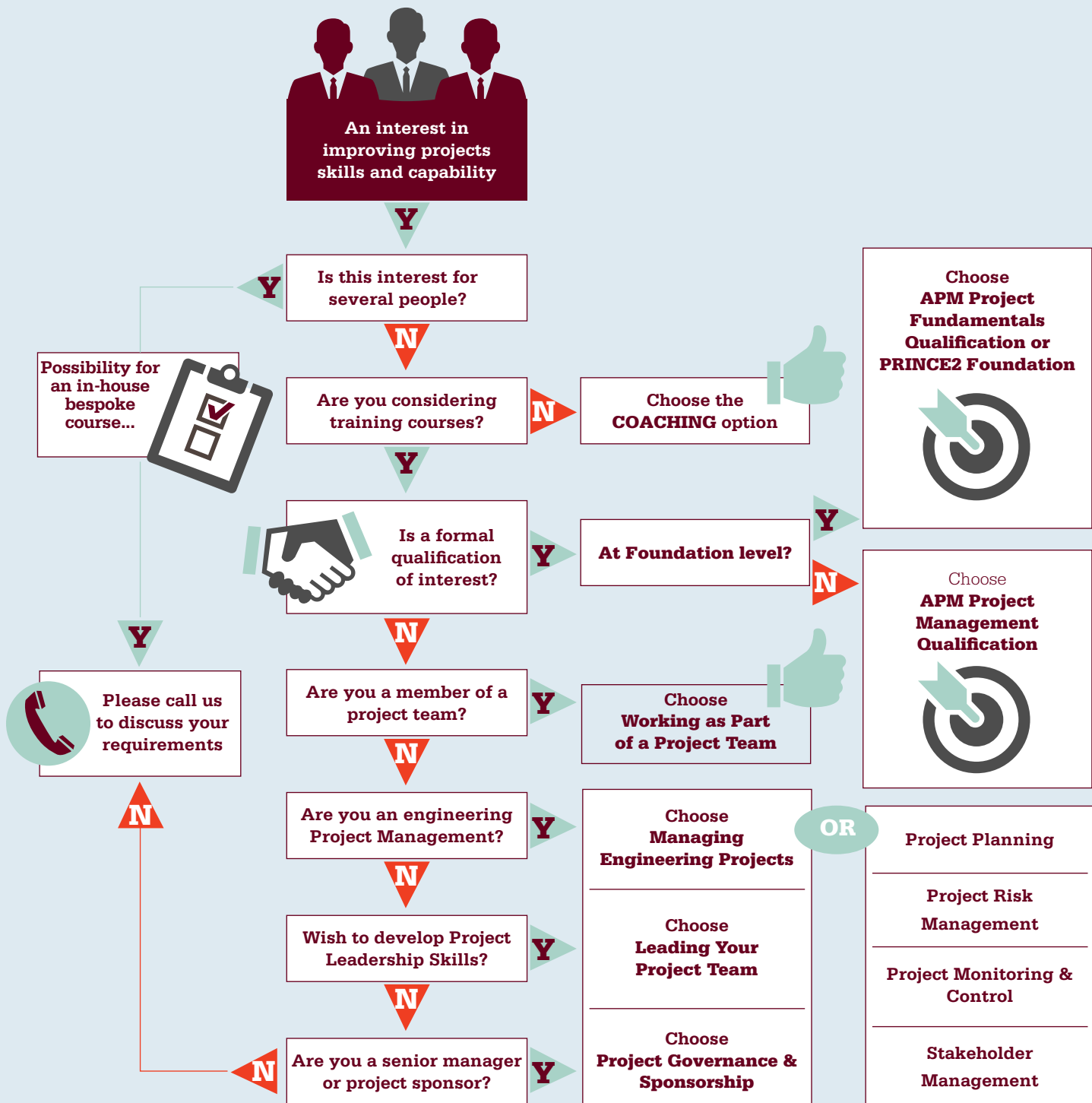
STAKEHOLDER MANAGEMENT

A 1-day course to address the challenges of stakeholder management and engagement with practical techniques.



*All courses are 2 days unless otherwise stated.

WHICH COURSE IS RIGHT FOR YOU?



Call our experienced training advisors to get more information and discuss your training needs on +44(0)207 304 6907 or email us at training@imeche.org

COURSE BOOKING FORM

Institution of
**MECHANICAL
ENGINEERS**

COURSE AND DELEGATE INFORMATION

Course name _____
Course date _____
Location _____
Delegate name _____
Membership number _____
Delegate email (Mandatory) _____
Delegate contact number _____
Job title _____

PAYMENT OPTIONS – CREDIT CARD or PURCHASE ORDER

Name on card _____
16 digit card number _____
Card expiry date _____
Security code (three digits) _____
Do you require a VAT receipt Yes No

PURCHASE ORDER/ INVOICE (please attach a copy of the PO)

Purchase order number _____
Invoice address _____
Accounts contact details (name and phone) _____

FEE Prices will be quoted upon enquiry

HOW DID YOU HEAR FROM US?

- Online Email Recommendation Website
 Brochure Webinar Event
 Other:

Upon submission of this completed form you are agreeing to our Terms & Conditions.

IMechE Training and Professional Development
105 St Peter's Street, St Albans, Hertfordshire AL1 3EJ, UK. Tel: +44 (0) 1727 896061 Fax: +44 (0) 1727 896026
Company Registered in England No: 1103638 VAT Registered no GB 299 930493



THE MOST SUCCESSFUL PEOPLE NEVER STOP LEARNING

The Institution of Mechanical Engineers specialises in leadership and management training, helping talented technical professionals learn the skills they need to become effective leaders and build and inspire strong teams to support them.

Agile project management

APM Project Fundamentals Qualification

APM Project Management Qualification

Leading your project team

Managing engineering projects

PRINCE2 Foundation

Project governance & sponsorship

Project planning

Project risk management

Project monitoring & control

R&D project management

Stakeholder management

Working as part of a project team

One Birdcage Walk
Westminster
London
SW1H 9JJ
UK

T +44 (0)20 7304 6907
training@imeche.org
www.imeche.org/training