

MARITIME TRANSPORTATION MANAGEMENT ENGINEERING PhD PROGRAM COURSE DESCRIPTIONS

Course Code	Course Name	(T,A,L)	Credit	ECTS	Compulsory/Elective
MTM600	Environmental Aspects of Transportation	(3,0,0)	3	7,5	Elective

The transport sector is currently heavily fossil fuel dependent and, in advanced economies, accounts for around one quarter of carbon dioxide emissions. This module will provide you with a systematic understanding of the inter-relationships between transport, energy and the environment, along with a comprehensive understanding of the advanced techniques that are used to study these relationships and to determine appropriate mitigation and adaptation policies.

Course Code	Course Name	(T,A,L)	Credit	ECTS	Compulsory/Elective
MTM605	Maritime Management	(3,0,0)	3	7,5	Elective

Logistics and supply chain management, maritime industry, transportation contracts, flag state and port state practices, ship registration, ship classification, ISM (international safety management), marine insurance, maritime markets, maritime company management.

Course Code	Course Name	(T,A,L)	Credit	ECTS	Compulsory/Elective
MTM607	Engineering Economics for Shipping and Ship Design	(3,0,0)	3	7,5	Elective

Management of a shipping company and even a single ship is an investment that has to be re-covered and should provide a net gain to the shipowner in a fairly short time. In the modern world of bank loans and credits, the money gained from the cargo or passenger freight or the services provided should partially be paid back to the crediting institution, partially all costs related to fuel, personnel, port dues, repair and maintenance and taxes should be financed and in the end a profit should be gained. Those require a set of engineering calculations related to the time-value of money, intricacies of maritime trade and port operations. This course aims to give an insight to such calculations and the philosophy of maritime operations.

Course Code	Course Name	(T,A,L)	Credit	ECTS	Compulsory/Elective
MTM608	Underwater Science	(3,0,0)	3	7,5	Elective

This course provides an introduction to marine organisms and the physical and biological processes that affect them in a context that will be useful for mariners and those who work close to the sea. The course begins with an exploration of the general scientific concepts behind the occurrence, understanding, classification and conservation of marine biological assets. The course then moves on to an investigation of various marine organisms as well as their adaptations to the marine environment that affect maritime traffic and safety. The overall emphasis is on the physical, chemical and biological factors behind the formation and maintenance of marine ecosystems and the complex biological interactions therein.

Course Code	Course Name	(T,A,L)	Credit	ECTS	Compulsory/Elective
MTM609	Marine Ecology	(3,0,0)	3	7,5	Elective

Structure and function of marine biotic communities and the important biotic and physical processes that affect them, largely examining the ecology of coastal marine communities, especially benthic communities, rather than pelagic communities and processes covered in the biological oceanography courses offered in the Department of Ocean, Earth and Atmospheric Sciences.

Course Code	Course Name	(T,A,L)	Credit	ECTS	Compulsory/Elective
MTM611	Seminar	(0,0,0)	0	7,5	Compulsory

Processes such as research for the thesis study, literature review, determining the appropriate method for preparing a presentation, and as a result of these processes, developing the ability to explain, discuss and communicate in front of the group. Gaining the ability to effectively conduct and manage the scientific research process related to the thesis topic. At the end of the semester, the student will make a presentation in front of all instructors.

Course Code	Course Name	(T,A,L)	Credit	ECTS	Compulsory/Elective
MTM613	Coastal Zone Management	(3,0,0)	3	7,5	Elective

Discussion of past and present activities and potential future applications in integrated coastal management using a case study approach. Main principles, strategies and methods in coastal management, basic processes of coastal management plan development and implementation.

Course Code	Course Name	(T,A,L)	Credit	ECTS	Compulsory/Elective
MTM614	Current Issues in Maritime Transportation Management	(3,0,0)	3	7,5	Elective

The characteristics of the maritime industry and the container shipping industry in particular, the main players in Maritime Logistics, the specific competitive challenges faced by transportation/logistics operators, shipping companies and ports, the economics and key trade-offs associated with maritime logistics decisions.

Course Code	Course Name	(T,A,L)	Credit	ECTS	Compulsory/Elective
MTM615	Marine Protected Area Design	(3,0,0)	3	7,5	Elective

The rationale, advantages and disadvantages of marine protected areas (MPAs). The science of IBAs, traditional approaches to fisheries management. The importance of ecological principles when establishing IBAs. An overview of sampling theory, the empirical data needed to document the success or failure of IBAs.

Course Code	Course Name	(T,A,L)	Credit	ECTS	Compulsory/Elective
MTM616	Maritime Modeling	(3,0,0)	3	7,5	Elective

Learning the concepts of Hotspot and Biodiversity; Examination of hotspots in the world; Understanding the basic concepts of Marine Protected Areas; Understanding the management of Marine Protected Areas; Examination of examples of Marine Protected Areas in our country; Understanding the status of Marine Protected Areas in our country; Marine Protected Areas and ecosystem services; Ecotourism, Fisheries, Global Warming and Social Culture and Marine Protected Areas Relationship.

Course Code	Course Name	(T,A,L)	Credit	ECTS	Compulsory/Elective
MTM619	Advanced Decision-Making Techniques in Maritime Management	(3,0,0)	3	7,5	Elective

This course focus on management, decision making, problem solving. It also focuses on the human error factor in maritime accidents, personnel management and problem solving in offshore conditions. The objectives of this course are: to provide knowledge and skills in problem solving both onboard and onshore, to provide knowledge and skills related to crises management both ships and maritime companies, to acquire the ability to analytic make case analysis.

Course Code	Course Name	(T,A,L)	Credit	ECTS	Compulsory/Elective
MTM621	Marine Spatial Planning	(3,0,0)	3	7,5	Elective

Marine spatial planning, national and international examples of marine spatial planning, Spatial Vision perspective for the marine environment, Marine Spatial Planning for users of the marine environment including industry, government, conservation, energy and recreation.

Course Code	Course Name	(T,A,L)	Credit	ECTS	Compulsory/Elective
MTM622	Python Program Language for Climate and Marine Sciences	(3,0,0)	3	7,5	Elective

Today, equipping ships with AIS transponders offers the opportunity to work with big data in many fields within the maritime discipline. The need for useful program languages for data analysis is increasing day by day, especially in model studies that give high resolution results. Python is a programming language used in many fields such as machine learning, artificial intelligence, big data, and statistics. Furthermore, Python is one of the most useful programming languages in model studies, which offers a wide range of ship emission calculations and air quality models in the environmental dimension, and risk analysis and accident modeling in the navigational dimension. With this course, it is aimed to teach the maritime transport and management engineering master students the Python program language that they can use in many areas of maritime.

Course Code	Course Name	(T,A,L)	Credit	ECTS	Compulsory/Elective
MTM623	R Program Language for Climate and Marine Science Studies	(3,0,0)	3	7,5	Elective
Installation and Features of R Language. Command Packages, Function Structures. Mathematical Operations in R, Variables, Vectors, Matrices, Arrays, Lists, Data Analysis, Temporal Analysis, Spatial Analysis, Graphic Drawings with R, Programming with R.					

Course Code	Course Name	(T,A,L)	Credit	ECTS	Compulsory/Elective
MTM624	Management of Ship Maintenance	(3,0,0)	3	7,5	Elective
One of the two main tasks of a marine engineer, apart from operating the ship is to execute repair operations when necessary and perform the maintenance of various systems and equipment onboard a ship. To do these tasks, he/she should be able to make decisions, organize the crew and the repair/maintenance team, adopt a proper maintenance strategy and also maintain the spare parts inventory onboard the ship at an acceptable and economical level. This course provides an insight to the failure analysis, reliability theory and repair-maintenance-spare parts logistics analysis for the maritime personnel both serving onboard a ship and on the shore-based repair teams.					

Course Code	Course Name	(T,A,L)	Credit	ECTS	Compulsory/Elective
MTM625	Vibrations and Dynamics of Marine Engineering Systems	(3,0,0)	3	7,5	Elective
Theory of vibrations and their causes and remedies are presented with special reference to ships and internal combustion engines. Both low-frequency vibrations (ship motions in a seaway) and high frequency hull and local vibrations are studied. Insight to analytical and numerical approximations are presented. Methods of mitigation and isolation of mechanical vibrations are studied.					

Course Code	Course Name	(T,A,L)	Credit	ECTS	Compulsory/Elective
MTM628	System Dynamics and Feedback Control of Marine Engineering Systems	(3,0,0)	3	7,5	Elective
Theory of automatic control in marine engineering systems, feedback control concept, stability and frequency responses of feedback control systems, design of control systems, applications of proportional, derivative, integral and PID systems in marine engineering. Concepts of robustness and controllability. Examples from heat engines and electric motors.					

Course Code	Course Name	(T,A,L)	Credit	ECTS	Compulsory/Elective
MTM629	Applied Computational Fluid Dynamics	(3,0,0)	3	7,5	Elective
General conservation laws and boundary conditions. Application of the finite volume method to the equations of fluid mechanics and heat transfer. Diffusion, convection, transient and source terms of the equations. Numerical approaches, algebraic equations, computational cell structure. Application of boundary conditions. Introduction to turbulent flow, transition from laminar to turbulent flow, turbulent Navier-Stokes equations, characteristics of turbulent flow, turbulence models and their equations, k-ε turbulence model, boundary conditions. Principles of Computational Fluid Dynamics (CFD), boundary conditions, source terms. Solution of various engineering problems using a commercial CFD code: three dimensional heat conduction, forced convection inside a channel, variable cross section and blocked channel flow, natural and mixed convection problems, transient flow and heat transfer, impinging fluid jets, problems on cooling of electronic components, and similar two/three dimensional, laminar/turbulent, steady/transient, flow and heat transfer problems in cartesian/polar coordinates.					

Course Code	Course Name	(T,A,L)	Credit	ECTS	Compulsory/Elective
MTM630	Scientific Research Methods and Ethics	(3,0,0)	3	7,5	Compulsory

The course focuses on the fundamental principles and techniques of scientific research while emphasizing ethical standards and practices. Students are introduced to the process of identifying research problems, formulating hypotheses, and designing research studies using appropriate methodologies. The course also covers data collection, analysis, interpretation, and reporting in adherence to ethical guidelines. Topics such as plagiarism, intellectual property rights, ethical dilemmas in research, and the responsibilities of researchers are explored. By the end of the course, students will be equipped with the skills to conduct scientifically sound and ethically responsible research, contributing to their academic and professional development.