MA Marine

Design of Lightweight Composites & Structures

ONLINE

12th - 13th October 2026

ABOUT THE COURSE

The modern trend in selection of materials for high strength-weight ratio is governed by the growing need for low-cost high performance structures. The amount of material has a direct bearing on cost. Therefore, the first step towards the cheapest structure is to minimize the weight without disproportionately affecting the fabrication cost.

Composite Materials and Structures" offers a foundational understanding of composite materials, including their components, mechanics, and various types of laminated panels used in civil, aircraft, and marine structures. It provides valuable insights for both students and industry professionals on fabrication techniques, design methodologies, and testing procedures related to composite materials. The course also delves into the behavior of composite laminated panels under different static and dynamic loads, as well as the effects of environmental degradation, using experimental and numerical analyses. Additionally, it includes a case study on fiber-reinforced polymer decks for new construction and retrofitting approaches for building structures, to give professionals a practical understanding of real-world applications.

WHO SHOULD ATTEND?

Engineers and scientists involved in the design, operation and assessment of composite structures and their associated equipment. Personnel from oil companies, consultancy organizations, classification societies and certifying authorities will benefit from attending this course.

COST

The registration fee of the workshop will be £650 Plus VAT (VAT UK only) which includes course notes.

PAYMENT

We will send you an invoice for the course fee after you have registered on the course. The payment can be made via bank transfer or online credit/debit card payment. If you need any further information, please contact us by email: info@mam.engineer

PROGRAMME

Time (GMT)	Title	Lecturer
Day 1: Monday, 12th October 2026		
9:00 - 10:30	**Lecture 1: Introduction to Lightweight structures, Mechanics of Composite materials, types of Composite materials-I**	Prof. Chaitali Ray
	Break	
11:00 - 12:30	**Lecture 2: Introduction to Lightweight structures, Mechanics of Composite materials, types of Composite materials-II**	Prof. Chaitali Ray
	Break	
13:30 - 15:00	**Lecture 3: Structural Behaviours and Analysis of Composite Materials and Structures-I**	Dr. Jiping Bai
	Break	
15:30 - 17:00	**Lecture 4: Structural Behaviours and Analysis of Composite Materials and Structures-II**	Dr. Jiping Bai

Time (GMT)	Title	Lecturer
Day 2: Tuesday, 13th October 2026		
9:00 - 10:30	**Lecture 5: Design, Durability, and Sustainability -I**	Dr. Jiping Bai
	Break	
11:00 - 12:30	**Lecture 6: Design, Durability, and Sustainability -II**	Dr. Jiping Bai
	Break	
13:30 - 15:00	**Lecture 7: Case Studies: New construction and Retrofitting-I**	Prof. Chaitali Ray
	Break	
15:30 - 17:00	**Lecture 8: Case Studies: New construction and Retrofitting-II**	Prof. Chaitali Ray

❖ ***LECTURE CONTENT***

Lecture 1 and 2 :-

➢ **Introduction to Lightweight structures, Mechanics of Composite materials, types of Composite materials**

- Introduction to lightweight structures, application in industries (30 min)
- Different types of composite materials and laminae, constituents, lamina and laminates, unidirectional, bi-directional and hybrid laminates (1.5 hours)
- Mechanics of composite materials: (1 hour)

Lecture 3&4 :-

➢ **Structural Behaviours and Analysis of Composite Materials and Structures**

- Core Focus: Behaviours of composites and structures, and Structural Analysis
- structural behaviour and failure mechanism
- structural analysis and modelling

Lecture 5&6 :-

➢ **Design, Durability, and Sustainability**

- Core Focus: Structural design with polymer composites, durability, sustainability, environmental impact, embodied carbon emissions
- designing with polymer composites
- durability and sustainability
- structural health monitoring

Lecture 7 and 8 :-

➢ **Case Studies: New construction and Retrofitting**

- Fibre reinforced polymer Bridge Deck (2.5 hours)
- Retrofitting approaches in structures (30 min)

LECTURERS

Professor Chaitali Ray

Indian Institute of Engineering, Science and Technology, Shibpur, India

Dr. Chaitali Ray is a Professor in the Department in Civil Engineering, Indian Institute of Engineering Science and Technology, Shibpur, India. She is currently the Head of the Department of Civil Engineering. She received Doctoral degree in the Department of Ocean Engineering and Naval Architecture, IIT Kharagpur in 1998. She is involved in teaching and research over 26 years in the fields of Structural Engineering, Dynamics, Computational mechanics, Composite structures and Finite Element Method. Her current research area includes experimental and numerical modelling of laminated composite plates and shells, hybrid composites, biocomposites, hygrothermal analysis, experimental vibration, failure analysis of composite structures and finite element modelling of FRP Bridge deck. She has undertaken 6 research projects on composite structures. She has published 44 papers in peer reviewed Journals, 42 Conference Papers including 5 Invited Talks and edited Book chapters with Pearson International Edition. She has produced 5 PhDs and 1 is ongoing. She is presently handling a research project funded by ANSYS Inc. in a team of two faculty members and one post-doctoral fellow.

Dr. Jiping Bai

Dr Jiping Bai is an Associate Professor at the University of South Wales and a Senior Fellow of the Higher Education Academy. He is Lead Consultant in Structural and Materials Engineering and currently leads the Engineering Research and Innovation Group. With over 30 years of experience across industrial practice, teaching, and research, his expertise spans sustainable materials, structural engineering, and computational intelligence.

He has authored over 100 publications, including articles in high-quality academic journals and peer-reviewed proceedings, as well as edited book on FRP, book chapters, and databases. As principal investigator, he has secured research funding and consultancy from research councils, European FP6, the European Social Fund, the Welsh Assembly Government, and national and international academic and industrial partners.

His professional contributions include peer review for UKRI research councils, journals and conferences, Associate Editorship of Construction Innovation, guest editorships for Applied Sciences (MDPI), and service on international scientific committees.