

**MEMO 2003 : MARINE ENVIRONMENT AND RENEWABLE ENERGY**  
**COURSE DEVELOPER : DR FARAH ELLYZA HASHIM**

**MEMO 2003**  
**MARINE ENVIRONMENT**  
**AND RENEWABLE**  
**ENERGY**

MASTER OF SCIENCE (MECHANICAL ENGINEERING)

SHIP TECHNOLOGY / OFFSHORE TECHNOLOGY



**TOPIC OF LECTURE NOTES**

**1.0 Oceanic Atmosphere**

- 1.1 Origins of the Atmosphere and Ocean Basics
- 1.2 Atmospheric Measurement
- 1.3 Atmospheric Pressure and Wind
- 1.4 Waves and Tides
- 1.5 Oceanic Calculation

**2.0 Weather system**

- 2.1 Climatology and Weather System
- 2.2 Air Masses
- 2.3 Warm Front and Cold Front
- 2.4 Cyclones
- 2.5 Navigation within Cyclones

**3.0 Climate Change**

- 3.1 Climate Change Modelling
- 3.2 Influence of climate on ocean processes
- 3.3 General Climatology of the Oceans
- 3.4 Regulation on Managing Climate Change

**4.0 Sustainability of Marine Environment**

- 4.1 Introduction of Sustainability Principles
- 4.2 Sustainability of Marine and Maritime Operation
- 4.3 IMO Regulations for Sustainability of Marine Environment

**5.0 Marine Renewable Energy**

- 5.1 Introduction of Marine Renewable Energy
- 5.2 Context of Marine energy (global/UK context, energy roadmaps)
- 5.3 Key Energy Concepts (Kinetic Energy, Potential Energy, Wave energy, Tidal Energy)

**6.0 Energy Conversion**

- 6.1 Wave Energy Conversion
- 6.2 Marine Current Conversion

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**MARE**

**UTM** UNIVERSITI TEKNOLOGI MALAYSIA

**CHAPTER: ORIGINS OF THE ATMOSPHERE AND OCEAN BASINS**  
**MEMO2003: Marine Environment and Renewable Energy**  
**Master Of Science (Mechanical Engineering)-**  
**Ship Technology / Offshore Technology**

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**CONTENTS OF CHAPTER**

- 01 INTRODUCTION TO ATMOSPHERE
- 02 ATMOSPHERIC TEMPERATURE
- 03 ATMOSPHERIC STABILITY

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6

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**CHAPTER: CLIMATOLOGY ; WEATHER SYSTEM**  
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**CONTENTS OF CHAPTER**

- 01 CLIMATOLOGY
- 02 WEATHER FORECASTING
- 03 CLIMATE CHANGE MODELLING

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7

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## **PREFACE**

This course is an elective course with 3 credits (4 ECTS), offered specifically to the students of Master of Science (Mechanical Engineering) with Ship/ Offshore Technology track; and was developed by Faculty of Mechanical Engineering, Universiti Teknologi Malaysia.

This course is designed to give students an understanding of the science of marine environment particularly waves and tides, and how this affects efforts to exploit energy from these resources. Students will first be introduced to fundamentals of oceanography and marine meteorology. It explains the fluid physical characteristics and movement on the earth. As such, the student will have a clear understanding of the weather that results from the interaction between the atmosphere and the sea surface.

Students will then learn on marine environmental issue related to ship and offshore structure. This course also introduces the main forms of marine renewable energy particularly wind, wave and tidal, focusing on the technology and resource assessment associated with each.

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## **AUTHOR'S BIOGRAPHY**

Dr. Farah Ellyza Hashim is currently a senior lecturer and the track coordinator for postgraduate programme (MSc in Mechanical Engineering) for ship and offshore technology track in School of Mechanical Engineering, Faculty of Engineering.

Her current research interests include marine renewable energy, marine environment, ship design and naval architecture. Some of the courses that she taught for undergraduate level is Ship and Offshore Design, Naval Architecture, Marine Transport, and others Mechanical subjects.

Apart from teaching and research activities, she is also involved in assisting and facilitating Prof. Dr. Omar Yaakob in conducting series of short courses in the field of Naval Architecture and Ship Design to various Maritime Companies and Government Agencies.

Dr. Arifah Ali is currently a senior lecturer and the track coordinator for postgraduate programme (MSc in Mechanical Engineering) for ship and offshore technology track in Faculty of Mechanical Engineering, Faculty of Engineering.

Her current research interests include ship powering and propulsion, propeller design, advance marine design, maritime safety, and marine tourism. She is actively involved in conducting hydrodynamic model test and CFD simulation of ship and offshore structure at Marine Technology Center, UTM. Some of the courses that she taught for undergraduate and postgraduate level are Ship Resistance, Naval Architecture, Marine Management and Environment, Maritime Safety and Risk, Marine Transport, and others Mechanical subjects.

Apart from teaching and research activities, she is also involved in conducting series of short courses in the field of Naval Architecture and Ship Design to various Maritime Companies and Government Agencies.

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