国家出版基金项目
NATIONAL PUBLICATION FOUNDATION

国际海事组织海员行为示范
MODEL COURSE 4.05

船舶能效操作

ENERGY EFFICIENT OPERATION OF SHIPS（2014）

中华人民共和国海事局 译

中英对照

大连海事大学出版社
DALIAN MARITIME UNIVERSITY PRESS

国家出版基金项目
NATIONAL PUBLICATION FOUNDATION

国际海事组织海员行为示范
MODEL COURSE 4.05

船舶能效操作

ENERGY EFFICIENT OPERATION OF SHIPS（2014）

中华人民共和国海事局 译

中英对照

大连海事大学出版社
DALIAN MARITIME UNIVERSITY PRESS

国际海事组织2014年第一次出版

4 Albert Embankment, London SE1 7SR

图书在版编目(CIP)数据

船舶能效操作：汉英对照 / 国际海事组织著；中华人民共和国海事局译. — 大连：大连海事大学出版社，2016.10

（国际海事组织海员行为示范）

书名原文: ENERGY EFFICIENT OPERATION OF SHIPS

ISBN 978-7-5632-3386-1

Ⅰ.①船… Ⅱ.①国… ②中… Ⅲ.①船舶管理—技术培训—教材—汉、英 Ⅳ.①U692

中国版本图书馆CIP数据核字(2016)第252382号

大连海事大学出版社出版

地址：大连市凌海路1号 邮编：116026 电话：0411-84728394 传真：0411-84727996

http://www.dmupress.com E-mail:cbs@dmupress.com

大连住友彩色印刷有限公司印装 大连海事大学出版社发行

2016年10月第1版 2016年10月第1次印刷

幅面尺寸：210 mm × 297 mm 印数：1～3000册

印张：8 字数：241千

出 版 人：徐华东 策 划：徐华东

责任编辑：孙夏君 责任校对：宋彩霞

封面设计：解瑶瑶 版式设计：孟 冀 解瑶瑶

ISBN 978-7-5632-3386-1 定价：25.00元

国际海事组织海员行为示范
编审委员会

Foreword

Since its inception the International Maritime Organization (IMO) has recognized the importance of human resources to the development of the maritime industry and has given the highest priority to assisting developing countries in enhancing their maritime training capabilities through the provision or improvement of maritime training facilities at national and regional levels. IMO has also responded to the needs of developing countries for postgraduate training for senior personnel in administrations, ports, shipping companies and maritime training institutes by establishing the World Maritime University in Malmö, Sweden, in 1983.

Following the adoption of the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers, 1978 (STCW), a number of IMO Member Governments had suggested that IMO should develop model training courses to assist in the implementation of the Convention and in achieving a more rapid transfer of information and skills regarding new developments in maritime technology. IMO training advisers and consultants also subsequently determined from their visits to training establishments in developing countries that the provision of model courses could help instructors improve the quality of their existing courses and enhance their implementation of the associated Conference and IMO Assembly resolutions.

In addition, it was appreciated that a comprehensive set of short model courses in various fields of maritime training would supplement the instruction provided by maritime academies and allow administrators and technical specialists already employed in maritime administrations, ports and shipping companies to improve their knowledge and skills in certain specialized fields. With the generous assistance of the Government of Norway, IMO developed model courses in response to these generally identified needs and now keeps them updated through a regular revision process taking into account any amendments to the requirements prescribed in IMO instruments and any technological developments in the field.

These model courses may be used by any training institution and, when the requisite financing is available, the Organization is prepared to assist developing countries in implementing any course.

K. SEKIMIZU
Secretary-General

前　言

国际海事组织（IMO）自成立伊始就认识到人力资源对海运事业发展的重要性，并通过优先考虑在国家和地区层面上提供或改善海事培训设备来帮助发展中国家增强其海事培训能力，同时，为满足发展中国家培养主管机关、港口、航运公司和海事培训机构高级人才的需求，IMO于1983年在瑞典的马尔默市成立了世界海事大学。

在《1978年海员培训、发证和值班标准国际公约》（STCW）通过之后，一些IMO成员国政府即建议IMO开发示范课程以配合公约的履行及加快航海技术新发展的信息和技术的传播。IMO的培训顾问及专家在参观访问发展中国家的培训机构之后认为示范课程的建立将有助于教师提高现有课程的质量，也有助于加强履行有关IMO大会公约及决议案要求。

此外，IMO还意识到一系列海事培训领域的短期综合示范课程将有助于补充各缔约国海运院校的教学，也有助于海事主管机关、港口及航运公司的主管人员和技术专家进一步提高他们在某些专业领域的知识和技能。因此，在挪威政府的大力支持下，IMO开发了一系列示范课程来满足这些普遍认可的需求，同时考虑到专业技术的发展及IMO修正案要求，通过定期修订程序对各示范课程进行更新。

任何培训机构都可以使用这些示范课程，并且当具备必要的财政经费时，IMO将协助发展中国家实施任何示范课程。

关水康司

秘书长

CONTENTS

Page

Foreword iv

Introduction 2

Part A: Course Framework 8

Part B: Course Outline and Timetable 14

Part C: Detailed Teaching Syllabus 20

Part D: Instructor Manual 38

Part E: Evaluation 72

Attachment Guidance on the Implementation of IMO Model Courses 78

目　录

页码

前言 …… v

介绍 …… 3

A部分：课程框架 …… 9

B部分：课程概要和时间表 …… 15

C部分：教学大纲细则 …… 21

D部分：教员手册 …… 39

E部分：评估 …… 73

附件 IMO示范课程实施指南 …… 79

4.05 MODEL COURSE

Introduction

■ Purpose of the model courses

The purpose of the IMO model courses is to assist training providers and their teaching staff in organizing and introducing new training courses, or in enhancing, updating or supplementing existing training material, so that the quality and effectiveness of the training courses may thereby be improved.

It is not the intention of the model course programme to present instructors with a rigid "teaching package", which they are expected to "follow blindly". Nor is it the intention to substitute the instructor's presence with audiovisual or programmed material. As in all training endeavours, the knowledge, skills and dedication of the instructors are the key components in the transfer of knowledge and skills to those being trained through IMO model courses.

Rather, this document should be used as a guide with the course duration given as indicative of the expected time required to cover the required outcomes. The parties may modify this course to suit their respective training schemes.

For those following planned training schemes approved by the Administration, it is intended that this training may form an integral part of the overall training plan and be complementary to other studies. The training may be undertaken in progressive stages; for such candidates, it is not appropriate to specify the duration of the learning, provided achievement of the specified learning outcomes is properly assessed and recorded.

Because educational systems and the cultural backgrounds of participants in maritime subjects vary considerably from country to country, the model course material has been designed to identify the basic entry requirements and participants' target group for each course in universally applicable terms, and to specify clearly the technical content and levels of knowledge and skills necessary to meet the technical intent of IMO conventions and related recommendations.

■ Use of the model course

To use this model course the instructor should review the course plan and detailed syllabus, taking into account the information provided under the entry standards specified in the course framework. The actual level of knowledge and skills and the previous technical education of the participants should be kept in mind during this review. Any areas within the detailed syllabus which may cause difficulties because of differences between the actual participant entry level and that assumed by the course designer should also be identified. To compensate for such differences, the instructor is expected to delete from the course, or reduce the emphasis on, items dealing with knowledge or skills already attained by the participants. The instructor should also identify any academic knowledge, skills or technical training which participants may not have previously acquired.

介 绍

■ 示范课程的目的

IMO示范课程的目的是帮助海事培训机构及其教学人员组织和引进新的培训课程或改进、更新、补充现有的培训资料，以提高培训课程的质量和效果。

本示范课程计划的意图并不是向教员呈交一个他们期望“盲目遵循”的“教学包”，也不是用视听或“编排的”材料来代替教员的存在。在所有的培训活动中，知识、技能和教员的奉献是向IMO示范课程材料的受培训者传授知识和技能的关键构成要素。

此外，本示范课程是作为培训过程的指导性文件，表明为达到要求的培训效果所需要的预计时间，各缔约国可根据各自的实际情况对本示范课程加以修改以满足各自的培训要求。

对于那些已由主管机关批准的培训计划，本示范课程可以作为该整体培训计划的一部分，也可以作为其他科目培训的补充。培训可以分阶段实施，对于那些特定的学习成果已得到正确评估和记录的学员，再指定其持续学习的时间是不合适的。

由于不同国家接受航海类培训的学员所处教育体系和文化背景各不相同，所以示范课程采用通用术语设计，以适应各课程受培训目标人群的基本要求，并明确提出了需要满足的IMO有关公约及相关决议案所必需的技术内容、知识和技能水平。

■ 示范课程的使用

为使用示范课程，教员应当审视课程计划和教学大纲细则，考虑课程框架中规定的入学标准所提供的信息。在审视过程中，应当牢记学员知识和技能的实际水准以及从前的技术教育水平，并应当识别出在教学大纲细则范围内由于学员实际入门水准与课程设计者假定的水准之间的差异，可能导致困难的任何部分。为弥补这些差异，希望教员将涉及学员已经掌握的知识和技能的项目从课程中删除或不做重视。此外，教员应当识别出学员可能还没有掌握的任何学术知识、技能或技术训练。

By analysing the detailed syllabus and the academic knowledge required to allow training to proceed, the instructor can design an appropriate pre-entry course, or alternatively, insert, at appropriate points within the course, the elements of academic knowledge required to support the technical training elements concerned.

Adjustment of the course objectives, scope and content may be necessary if, within the respective maritime industry, the participants completing the course are to undertake duties which differ from the objectives specified in the model course.

Within the Course Outline and Timetable (Part B) the course designers have indicated their assessment of the time that should be allotted to each area of learning. However, it must be appreciated that these allocations are arbitrary and assume that the participants have fully met all entry requirements of the course. The instructor should therefore review these assessments and may need to reallocate the time required to achieve each specific learning objective.

■ Lesson plans

Having adjusted the course content to suit the participant intake and any revision of the course objectives, the instructor should draw up lesson plans based on the detailed syllabus. The syllabus contains specific references to textbooks or teaching material suggested for use in the course. Where no adjustment has been found necessary in the learning objectives of the syllabus, the lesson plans may simply consist of the detailed syllabus with keywords or other reminders added to assist the instructor in presenting the material.

■ Presentation

The presentation of concepts and methodologies must be repeated in various ways until the instructor is satisfied that the participant has attained each specific learning objective or outcome. The syllabus is laid out with a learning objective format, and each objective specifies what the participant must be able to do to achieve the learning objective.

■ Evaluation or assessment of participants' progress

The nature of this course involves all the participants and the instructors in an on-going process of individual and group evaluation. However, as this course doesn't specify any time for evaluation, the process of evaluation or assessment of participants' progress should be confirmed during practical activities related to the subject area concerned. A guideline on evaluation is given in Part E of the course.

通过分析教学大纲细则以及技术领域培训所需的学术知识，教员可以设计出合适的预科课程，或在技术课程中的适当位置加入技术课程需要的学术知识。

如果完成该课程的学员在其所处的航海事业中要从事有别于本示范课程规定的课程目标的职责，则可能有必要调整课程的目标、范围和内容。

在课程概要和时间表（B部分）中，课程设计者已经表明了其估计的、应分配给每一个知识点的时间。但是，必须清楚的是，这些分配是主观的，并假设了学员完全符合本课程的入门要求。因此，教员应当对这些估计进行重新审视，而且可能需要重新分配时间以符合每一个特定培训目标。

■ 教案

为了便于学员接受，可对课程内容和课程目标进行调整和修改，那么教员就应该在教学大纲细则的基础上制订出课程计划。教学大纲细则中有建议使用的教科书或教学资料的具体参考。如果没有调整教学大纲细则的学习目标，那么课程计划可以单纯由教学大纲细则构成，添加一些关键词或其他提示，以帮助教员编写讲义。

■ 学员展示

教员必须以不同的方式反复讲授概念和方法，直到确信学员达到了每一个具体的培训目标或培训效果。教学大纲以培训目标的格式编排，并且每个目标都规定了学员必须做到的事情以作为培训的效果。

■ 评价或评估学员的收获

这门课程的性质涉及所有的学员和教员在培训过程中应进行个人和团体的评估。然而，由于本课程没有指定具体的评估时间，对学员收获的评价或评估过程应在相关的实操中确认。本课程的E部分给出了一个评估指南。

■ Implementation

For the course to run smoothly and to be effective, considerable attention must be paid to the availability and use of:

- properly qualified instructors;
- support staff;
- rooms and other training locations;
- equipment, e.g. projectors and simulators;
- textbooks, technical papers; and
- other reference material.

Thorough preparation is the key to successful implementation of the course. IMO has produced "Guidance on the implementation of IMO model courses", which deals with this aspect in greater detail and is included as an attachment to this course.

■ 实施

为使课程顺利进行和卓有成效，必须充分注意下列资源的获得和使用：

- 称职的教员；
- 教辅人员；
- 教室和其他培训场所；
- 设备，比如投影仪和模拟器；
- 教科书、科技论文；及
- 其他参考资料。

充分的准备是成功实施本课程的关键。IMO已经出版了“IMO示范课程实施指南”，它更加详细地涉及这一方面，并作为本课程的一个附件包含在内。

Part A: Course Framework

■ Scope

This model course is designed to facilitate the delivery of training in order to promote the energy efficient operation of ships. The course contributes to the IMO ' s environmental protection goals as set out in resolutions A.947(23) and A.998(25) by promulgating industry "Best Practices", which reduce greenhouse gas (GHG) emissions and the negative impact of global shipping on climate change. The course also covers essential subjects to develop management tools to assist a shipping company in managing the environmental performance of its ships. Therefore, the contents of the course reflect the guidance for the development of a Ship Energy Efficiency Management Plan (SEEMP), resolution MEPC.213 (63), adopted 2 March 2012.

■ Objectives

Having completed the course, the participants should be able to:

- state issues on climate change caused by the effect of greenhouse gas and international measures having been taken since the adoption of the Kyoto Protocol in 1997;
- identify considerations and actions taken by the International Maritime Organization to reduce or limit greenhouse gas emissions from international shipping;
- discuss and apply the details of best practices for fuel efficient operation of ships;
- establish a ship energy efficiency management plan in a shipping company; and
- maintain the plan in managing the environmental performance of its ships based on the four steps to improve energy efficiency of ships.

■ Entry standards

Entry to the course is open to those engaged in ship operation both on board and on shore who wish to improve their knowledge and understanding of the energy efficient operation of ships, especially those who are in charge of activities associated with the development of an SEEMP in shipping companies.

■ Course certificate

Participants completing the course satisfactorily should be issued with a certificate of participation or document describing the objectives of the course and attesting their successful completion of it.

■ Course intake limitations

The course intake is regulated by the number of participants in the class, of which the maximum number of participants should be around twenty. As the course contains some practical activities based on group discussion as well as the use of simulators, the total number of the participants should also be considered by the number of groups in the class.

A部分：课程框架

■ 范围

本示范课程旨在帮助培训的顺利进行，以促进船舶能效操作。通过颁布行业“最佳操作”，本课程还有助于实现国际海事组织（IMO）A.947(23）和A.998(25）决议的环境保护目标，以减少温室气体（GHG）排放和全球航运对气候变化的负面影响。本课程也涉及开发管理工具的基本内容，以协助航运公司从环保方面管理其船舶。因此，本课程的内容反映了国际海事组织第63届环保会于2012年3月2日以MEPC.213(63)决议通过的船舶能效管理计划（SEEMP）编制指南。

■ 目标

完成本课程培训后，学员应能够：

- 描述自1997年通过《京都议定书》以来，国际上已采取的措施及温室气体效应对气候变化造成的影响；
- 识别国际海事组织为减少或限制国际航行船舶的温室气体排放所进行的考虑和采取的行动；
- 讨论并应用使船舶燃油高效运行的最佳操作细节；
- 在航运公司建立船舶能效管理计划；及
- 在这四个步骤的基础上，维护其对船舶环保性能的管理，提高船舶的能源效率。

■ 入学标准

这门课程是针对那些在船上和岸上从事船舶操纵方面的工作且希望提高他们对船舶能效操作的认知和理解力的人员，特别是那些在船公司负责实施船舶能效管理计划（SEEMP）的相关人员。

■ 课程证书

学员在成功完成课程学习后，应签发结业证书或一份文件以证明持有者已成功完成课程培训。

■ 课程人数限制

本课程的班级人数应根据报名人数进行调节，每个班级的学员最多为二十人。当课程涉及一些基于小组讨论和模拟器使用的实操内容时，基于班级学员的总人数考虑班级的分组数量。