MASSACHUSETTS MARITIME ACADEMY
DEPARTMENT OF MARINE TRANSPORTATION

DANGEROUS LIQUID CARGO

Course MT-3151

Fall 2015

Classroom Instructor: Capt. Brady /Tankerman PIC DL/LG
Lab Instructors: Capt. Christensen/ Capt. Brady

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DLC Classes:	**MWF 1200-1250**	**Section 15**	**BR 305**
	MWF 1300-1350	**Section 16**	**BR 305**
	MWF 1500-1550	**Section 18**	**HA 102**

DLC Labs:
M 0800-0950 Section 11 Brady 204B
T 0800-0950 Section 21 Christensen 204B
T 1100-1250 Section 24 Christensen 204B
T 1300-1350 Section 26 Christensen 204B
W 0800-0950 Section 31 Brady 204B
Th 0800-0950 Section 41 Christensen 204B
Th 1100-1250 Section 44 Christensen 204B
Th 1300-1350 Section 46 Christensen 204B

SCOPE

The Dangerous Liquid Cargo Course is designed to meet the the STCW code regulations V/1 and V/2 as well as 46 CFR 10.910 and 46 Part 13 of the U.S. Code appropriate to the duties of Tankerman PIC. This course utilizes formal instruction, hands-on demonstrations and state of the art simulator training to provide students with experiences in liquid cargo handling that would otherwise demand years of seagoing experience.

COURSE LEARNING OBJECTIVES

The Dangerous Liquid Cargo Course is designed to meet the the STCW code regulations V/1 and V/2 as well as 46 CFR 10.910 and 46 Part 13 of the U.S. Code appropriate to the duties of Tankerman PIC. This course utilizes formal instruction, hands-on demonstrations and state of the art simulator training to provide students with experiences in liquid cargo handling that would otherwise demand years of seagoing experience.

The objective of this program of study is to familiarize the student with the loading, discharge and carriage of dangerous liquid cargoes. This program is designed to expose the student to the safety, firefighting, and pollution prevention and response issues related to the carriage of dangerous liquid cargoes

COURSE LEARNING OUTCOMES

The student will be able to recognize the important aspects of construction of tank vessels and their piping, pumping, inerting, ballasting, vapor control and tank washing systems. The student will demonstrate an ability to conduct simulated loading, discharging, ballasting, inert gas and tank washing operations. The student will be able to identify the characteristics, dangers, refining and distribution of petroleum products. The student will be able to recognize the safety, firefighting and pollution prevention and response issues related to the carriage of petroleum products by sea.

WEEKLY LEARNING OBJECTIVES

The expected learning outcome is that the trainee…

1. Explains tanker construction purpose and trade
2. Describes the exploration, refining and distribution of oil
3. Identifies tank layout and piping Systems
4. Demonstrates loading and discharging operations
5 Explains planning a load
6. Identifies safe ballast operations
7. Demonstrates tank cleaning operations
8. Describes Inert Gas and Crude Oil Wash Systems
9. Relates marine vapor control systems to vessel operations
10. Identifies the concepts behind tanker fire safety
11. Relates issues of oil in the environment to tanker safety
12.. Describes the duties of the 3rd and Chief Mates aboard a tank vessel

SPECIFIC COURSE OBJECTIVE

This course satisfies the training course requirements necessary for an endorsement as :
Tankerman-PIC
Tankerman PIC(Barge)
Tankerman -Assistant
Tankerman-Engineer

A grade of less than C- will not fulfill the USCG mandated STCW requirements for issuance of either a Third Mate Unlimited license or an STCW OICNW certificate. Demonstration of competencies relating to dangerous liquid cargo handling are also required for successful course completion.

PROCEDURE AND POLICY

Attendance at all classes and labs is mandatory. Disciplinary action and grade point reduction will be administered to policy offenders. **Unexcused absence from any lecture or lab will result in the individual being placed on report and a five point reduction in your FINAL average.** If unavoidable circumstances require you to miss a lecture or lab you must notify the instructor as far in advance as possible. Cadets missing any combination of **five** or more classes or labs will receive a **failing grade** for the course. Any missed lab must be made up and it is your responsibility to meet with your lab instructor to arrange such make-up. Examinations missed as a result of unauthorized absence incur a grade of **zero**. Cadets are responsible for all reading assignments, classroom lectures, and assigned projects. You may be quizzed at any time without notice. The grading policy is a 12 point system.

The grading matrix will be factored as follows

Regular Exams:	60%
Lab Competency:	10%
Participation/Attendance/Homework	10%
Final Exam	20%

Course materials will be handed out and should be kept neatly in a three ring binder for present and future reference.

At all times every cadet will observe Academy standards of personal appearance and conduct as specified by Academy regulations. This may include waiting for an instructor at least twenty minutes after the scheduled class start. Changes of Laboratory venue sometimes cause confusion. If so find your lab instructor!

It is the students' responsibility to seek extra help whenever needed. I am available as shown at the top of this syllabus and any other mutually convenient time. Please do not hesitate to seek help. If you need help I will find the time to help you!

USCG/ STCW approved DLC Syllabus

Textbook: TANKER OPERATIONS, Huber,5th Edition, CMP

Week	Topic	Reading assignment
1.	Tanker construction, Purpose and Trade	Ch. 1
2	Exploration, refining and distribution of oil	Ch. 2 and 3
3.	Tank Layout and Piping Systems	Ch. 4 and 7
4.	Loading and Discharging Operations	Ch. 8
5.	Planning a Load	Ch. 6
6.	Ballast Operations	Ch.11
7.	Tank cleaning operations	Ch. 12 and 13
8.	Inert Gas and Crude Oil Wash Systems	Ch. 15 and 12
9.	Marine Vapor Control Systems	Ch. 5
10.	Tanker Fire Safety	Ch. 16
11.	Oil in the Environment	Ch. 14
12.	Duties of the 3rd and Chief Mates	lecture

All lecture, reading and oral report material is fair game for tests. All reading assignments are expected to be completed before the week listed in the syllabus. Tanker Lab Projects will be assigned during weeks two and three of the semester. Attendance at all classes/ labs is mandatory. No eating, drinking or use of tobacco products is allowed. Any disclosure of learning disability must be made directly from the student to the instructor within the first two weeks of class. The Instructor will attempt to make any reasonable allowances.

DLC LAB SYLLABUS

LAB Number 1 Simulator Orientation
The expected Learning Outcome is that the trainee:
.1 Complete student Orientation for the Liquid Cargo Handling Simulator

.2 Identifies tank layout and piping systems of the Suezmax product carrier model: Tank numbering, system layout and the various cargo and support piping.

LAB Number 2 Tank Measurements and Gauging
The expected Learning Outcome is that the trainee:
.1 Demonstrate taking cargo measurements including ullages, thieving, water cuts and temperature

LAB Number 3 Tank Vessel Cargo Systems
The expected Learning Outcome is that the trainee:
.1 (examines) Pumps, Valves and Piping specifications. Tracing the piping systems aboard the LCHS.

.2 understands 46 CFR 32.50 Pumps, piping and hoses for cargo handling

.3 understands 46 CFR 32.55 ventilation and venting

LAB Number 4 Cargo Oil Loading Exercise
The expected Learning Outcome is that the trainee:
.1 Using the LCHS simulator, line-up empty tanker for cargo. All valves closed, tanks inerted. No VEC or IGS. Ballast full. Maintain status board, sign D.O. I., when ready, commence to load one grades via three hoses. Load to safely maximize rate of loading.

LAB Number 5 Cargo Oil Discharge Exercise
The expected Learning Outcome is that the trainee:
.1 Using the LCHS simulator, discharge specific tanks. All valves closed, tanks inerted. Minimal Ballast. Maintain status board. When ready commence to discharge all cargo via cargo pumps.

LAB Number 6 Ballast/ De-Ballast Exercise
The expected Learning Outcome is that the trainee:
.1 Use the LCHS simulator to load cargo while simultaneously discharging segregated ballast

LAB Number 7 IGS/ COW Exercise
The expected Learning Outcome is that the trainee:
.1 Use the LCHS simulator to monitor tank washing using the COW system. At the commencement of the exercise, the tanks are inerted and the IGS system is operating.

Cargo discharge is already in progress. Crude oil wash heavy weather ballast tanks.

LAB Number 8 Inert Gas / Crude Oil Washing Exercise
The expected Learning Outcome is that the trainee:
.1 Using the LCHS simulator, line-up the inert gas system and put gas to deck. Conduct atmosphere testing of tanks to be crude oil washed. Line up the crude oil wash system and commence washing operations of identified tanks after removing one meter of liquid from tanks used to supply the COW system.

LAB Number 9 Vapor Emission Recovery Exercise
The expected Learning Outcome is that the trainee:
.1 Using the LCHS simulator, line-up and operate VEC system, then commence loading the tanker.

LAB Number 10 Execution of a Loading Plan
The expected Learning Outcome is that the trainee:
.1 LCHS simulator exercise starts with discharge in progress. Student uses CARGOMAX to monitor hull stress, drafts and trim. Student develops skills in establishing rate for determining finish of cargo. Ballasting started and rates taken of cargo discharge and ballasting.

LAB Number 11 Execution of a Loading Plan
The expected Learning Outcome is that the trainee:
.1 Use the LCHS simulator, exercise involving partial discharge and stripping of cargo tanks. Student uses CARGOMAX to monitor hull stress, drafts and trim. Student to ballast accordingly to relieve excess stress and maintain trim and drafts within prescribed limits.

LAB Number 12 Execution of a ballast plan
The expected Learning Outcome is that the trainee:
.1 Use the LCHS simulator to Start Heavy Weather Ballast. Discharge is nearing completion. Top up all ballast tanks. Line up HeavyWeather Ballasting (Storm Ballast) of No. 3 port and No. 3 Stbd Cargo Tanks and Forepeak Tank using No.2 Cargo Pump.

STCW Competencies linked to Dangerous Liquid Cargo MT-3151

Learning Objectives

Demonstrate knowledge and understanding of the following STCW elements:

- AB-D-C1.3 Pipeline systems – bilge and ballast suctions and wells

- OICNW-B1.3 Ability to establish and maintain effective communications during loading and unloading
- T-OPS-X1.1 types of oil and chemical tankers
- T-OPS-X1.1 tanker general arrangement and construction
- T-OPS-X1.2 cargo piping systems and valves
- T-OPS-X1.2 cargo pumps
- T-OPS-X1.2 cargo loading and unloading
- T-OPS-X1.2 cargo tank cleaning, purging, gas-freeing and inerting
- T-OPS-X1.3 oil and chemical pressure and temperature, including vapour pressure/temperature relationship
- T-OPS-X1.3 types of electrostatic charge generation
- T-OPS-X1.3 chemical symbols
- T-OPS-X1.4 Knowledge and understanding of tanker safety culture and safety management
- T-OPS-X2.1 operations health hazards (tanker operations)
- T-OPS-X2.1 environmental hazards (tanker operations)
- T-OPS-X2.1 reactivity hazards (tanker operations)
- T-OPS-X2.1 corrosion hazards (tanker operations)
- T-OPS-X2.1 explosion and flammability hazards (tanker operations)
- T-OPS-X2.1 sources of ignition, including electrostatic hazards (tanker operations)
- T-OPS-X2.1 toxicity hazards (tanker operations)
- T-OPS-X2.1 vapour leaks and clouds (tanker operations)
- T-OPS-X2.2 inerting, water padding, drying agents and monitoring techniques (tanker hazards)
- T-OPS-X2.2 anti-static measures (tanker hazards)
- T-OPS-X2.2 ventilation (tanker hazards)
- T-OPS-X2.2 segregation (tanker hazards)
- T-OPS-X2.2 cargo inhibition (tanker hazards)
- T-OPS-X2.2 importance of cargo compatibility (tanker hazards)
- T-OPS-X2.2 atmospheric control (tanker hazards)
- T-OPS-X2.2 gas testing (tanker hazards)
- T-OPS-X3.1 Function and proper use of gas-measuring instruments and similar equipment
- T-OPS-X3.3 ship/shore safety checklist (tanker safety)
- T-OPS-X5.1 Basic knowledge of emergency procedures, including emergency shutdown
- T-OPS-X6.1 Basic knowledge of the effects of oil and chemical pollution on human and marine life
- T-OPS-X6.2 Basic knowledge of shipboard procedures to prevent pollution

- T-OPS-X6.3 report relevant information to the responsible persons (spill response)
- T-OPS-X6.3 assist in implementing shipboard spill-containment procedures (spill response)

STCW Table A-II/5.

AB-D-C1.3 Pipeline systems – bilge and ballast suctions and wells

able seafarer deck

Function

Navigation at the support level

Contribute to the safe operation of deck equipment and machinery
D-C1.3

Use and handling of deck and cargo-handling gear and equipment:

1. access arrangements, hatches and hatch covers, ramps, side/bow/stern doors or elevators
2. **pipeline systems - bilge and ballast suctions and wells**
3. cranes, derricks, winches

CC-MANT MT-2231 **MT-3151** MT-3261

STCW Table A-II/1

officer in charge of a navigation watch

Function

Cargo handling and stowage at the operational levelCompetence	Knowledge, Understanding & Proficiency	Locatio
	B1.1 *Cargo handling, stoage and securing* Knowledge of the effect of cargo, including heavy lifts, on the seaworthiness and stability of the ship	MT-424
	B1.2 Knowledge of safe handling, stowage and securing of cargoes, including dangerous, hazardous and harmful cargoes, and their effect on the safety of life and of the ship	MT-326
	B1.3Ability to establish and maintain effective communications during loading and unloading	
Monitor the loading, stowage, securing, care during the voyage and the unloading of cargoes		

MT-3151

STCW Table A-V/1-1-1

basic training for oil and chemical tanker cargo operations

Function

Basic oil and chemical tanker operations

Competence	Knowledge, Understanding & Proficiency	Location(s)
Contribute to the safe cargo operation of oil and chemical tankers	OPS-X1.1 Basic knowledge of tankers: 1. types of oil and chemical tankers 2. general arrangement and construction	MT-3151
	OPS-X1.2 Basic knowledge of cargo operations: 1. piping systems and valves 2. cargo pumps 3. loading and unloading 4. tank cleaning, purging, gas-freeing and inerting	MT-3151
	OPS-X1.3 Basic knowledge of the physical properties of oil and chemicals: 1. pressure and temperature, including vapour pressure/temperature relationship 2. types of electrostatic charge generation 3. chemical symbols	MT-3151
	OPS-X1.4 Knowledge and understanding of tanker safety culture and safety management	MT-3151
Take precautions to prevent hazards	OPS-X2.1	MT-3151

	Basic knowledge of the hazards associated with tanker operations, including: 1. health hazards 2. environmental hazards 3. reactivity hazards 4. corrosion hazards 5. explosion and flammability hazards 6. sources of ignition, including electrostatic hazards 7. toxicity hazards 8. vapour leaks and clouds	
	OPS-X2.2 Basic knowledge of hazard controls: 1. inerting, water padding, drying agents and monitoring techniques 2. anti-static measures 3. ventilation 4. segregation 5. cargo inhibition 6. importance of cargo compatibility 7. atmospheric control 8. gas testing	MT-3151
	OPS-X2.3 Understanding of information on a Material Safety Data Sheet (MSDS)	ST-0999D
Apply occupational health and safety precautions and measures	OPS-X3.1 Function and proper use of gas-measuring instruments and similar equipment	MT-3151

	OPS-X3.2 Proper use of safety equipment and protective devices, including: 1. breathing apparatus and tank-evacuating equipment 2. protective clothing and equipment 3. resuscitators 4. rescue and escape equipment	EN-1112 MT-4251 PE-0032
	OPS-X3.3 Basic knowledge of safe working practices and procedures in accordance with legislation and industry guidelines and personal shipboard safety relevant to oil and chemical tankers, including: 1. precautions to be taken when entering enclosed spaces 2. precautions to be taken before and during repair and maintenance work 3. safety measures for hot and cold work 4. electrical safety 5. ship/shore safety checklist	MT-3151 MT-4251
	OPS-X3.4 Basic knowledge of first aid with reference to a Material Safety Data Sheet (MSDS)	PE-0032
Carry out fire-fighting operations	OPS-X4.1 Tanker fire response organization and action to be taken	CC-FIRE
	OPS-X4.2	CC-FIRE

	Fire hazards associated with cargo handling and transportation of hazardous and noxious liquids in bulk OPS-X4.3	
	Fire-fighting agents used to extinguish oil and chemical fires OPS-X4.4	CC-FIRE
	Fixed fire-fighting foam system operations OPS-X4.5	CC-FIRE
	Portable fire-fighting foam operations OPS-X4.6	CC-FIRE
	Fixed dry chemical system operations OPS-X4.7	CC-FIRE
	Spill containment in relation to fire-fighting operations OPS-X5.1	CC-FIRE
Respond to emergencies	Basic knowledge of emergency procedures, including emergency shutdown OPS-X6.1	MT-3151
	Basic knowledge of the effects of oil and chemical pollution on human and marine life OPS-X6.2	MT-3151
Take precautions to prevent pollution of the environment from the release of oil or chemicals	Basic knowledge of shipboard procedures to prevent pollution OPS-X6.3	MT-3151
	Basic knowledge of measures to be taken in the event of spillage, including the need to: 1. report relevant information to the responsible persons	MT-3151

2. assist in implementing shipboard spill-containment procedures

STCW Table A-V/1-1-1

basic training for oil and chemical tanker cargo operations

Function

Basic oil and chemical tanker operations

Competence	Knowledge, Understanding & Proficiency	Location(s)
Contribute to the safe cargo operation of oil and chemical tankers	OPS-X1.1 Basic knowledge of tankers: 1. types of oil and chemical tankers 2. general arrangement and construction	MT-3151
	OPS-X1.2 Basic knowledge of cargo operations: 1. piping systems and valves 2. cargo pumps 3. loading and unloading 4. tank cleaning, purging, gas-freeing and inerting	MT-3151
	OPS-X1.3 Basic knowledge of the physical properties of oil and chemicals:	MT-3151

	1. pressure and temperature, including vapour pressure/temperature relationship 2. types of electrostatic charge generation 3. chemical symbols	
	OPS-X1.4 Knowledge and understanding of tanker safety culture and safety management	MT-3151
	OPS-X2.1 Basic knowledge of the hazards associated with tanker operations, including: 1. health hazards 2. environmental hazards 3. reactivity hazards 4. corrosion hazards 5. explosion and flammability hazards 6. sources of ignition, including electrostatic hazards 7. toxicity hazards 8. vapour leaks and clouds	MT-3151
Take precautions to prevent hazards	OPS-X2.2 Basic knowledge of hazard controls: 1. inerting, water padding, drying agents and monitoring techniques 2. anti-static measures 3. ventilation 4. segregation 5. cargo inhibition 6. importance of cargo compatibility	MT-3151

	7. atmospheric control 8. gas testing	
	OPS-X2.3 Understanding of information on a Material Safety Data Sheet (MSDS)	ST-0999D
	OPS-X3.1 Function and proper use of gas-measuring instruments and similar equipment	MT-3151
	OPS-X3.2 Proper use of safety equipment and protective devices, including: 1. breathing apparatus and tank-evacuating equipment 2. protective clothing and equipment 3. resuscitators 4. rescue and escape equipment	EN-1112 MT-4251 PE-0032
Apply occupational health and safety precautions and measures	OPS-X3.3 Basic knowledge of safe working practices and procedures in accordance with legislation and industry guidelines and personal shipboard safety relevant to oil and chemical tankers, including: 1. precautions to be taken when entering enclosed spaces 2. precautions to be taken before and during repair and maintenance work 3. safety measures for hot and cold work 4. electrical safety 5. ship/shore safety checklist	MT-3151 MT-4251

	OPS-X3.4	
	Basic knowledge of first aid with reference to a Material Safety Data Sheet (MSDS) OPS-X4.1	PE-0032
	Tanker fire response organization and action to be taken OPS-X4.2	CC-FIRE
	Fire hazards associated with cargo handling and transportation of hazardous and noxious liquids in bulk OPS-X4.3	CC-FIRE
Carry out fire-fighting operations	Fire-fighting agents used to extinguish oil and chemical fires OPS-X4.4	CC-FIRE
	Fixed fire-fighting foam system operations OPS-X4.5	CC-FIRE
	Portable fire-fighting foam operations OPS-X4.6	CC-FIRE
	Fixed dry chemical system operations OPS-X4.7	CC-FIRE
	Spill containment in relation to fire-fighting operations OPS-X5.1	CC-FIRE
Respond to emergencies	Basic knowledge of emergency procedures, including emergency shutdown OPS-X6.1	MT-3151
Take precautions to prevent pollution of the environment from	Basic knowledge of the effects of oil and chemical pollution on human and marine life	MT-3151

the release of oil or chemicals	OPS-X6.2 Basic knowledge of shipboard procedures to prevent pollution	MT-3151
	OPS-X6.3 Basic knowledge of measures to be taken in the event of spillage, including the need to: 1. report relevant information to the responsible persons 2. assist in implementing shipboard spill-containment procedures	MT-3151