OPC (EN-3216)- OpCons (Electronic & Control Instrumentation)

Operational Controls - FALL 2015 (STCW)

Operational Controls studies the principles of industrial measurement and control with emphasis on practical applications aboard ship and in industry. Topics will include electronic sensing, measurement & transmission of data from industrial processes, closed-loop feedback & automatic control systems, analog & digital control hardware, and control modes & configurations. Mechanical, electronic, analog and digital control mechanisms will be discussed, as will programmable logic controllers. *Co-requisite: EN-3212 STCW: Knowledge*

Learning Outcomes and STCW Demonstrated Knowledge, Understanding & Proficiency:

OICEW-A4.1 Basic construction and operation principles of automatic control systems
OICEW-A5.1 Operational characteristics of control systems
OICEW-B1.1 Basic configuration & operation of sequential control circuits & associated devices
OICEW-B1.2 Flowchart for automatic and control systems
OICEW-B1.2 Functions, characteristics and features of control systems for machinery items
OICEW-B1.3 Various automatic control methodologies and characteristics
OICEW-B1.3 Proportional–Integral–Derivative (PID) control characteristics
OICEW-B1.3 Associated system devices for process control
OICEW-B1.3 Configuration and operation principles of control systems
OICEW-B2.5 Function and performance tests of electrical & electronic monitoring systems
OICEW-B2.5 Function and performance tests of electrical & electronic control devices
OICEW-B2.5 Function and performance tests of electrical and electronic protective devices

Text: **Instrumentation and Process Control**
Franklyn W. Kirk, Thomas A. Weedon, Philip Kirk, 6th Edition, ATP

Instructor: Dr. John J. Bausch Phone: (508) 830-5000 (x-2029)
Email: jbausch@maritime.edu Room: HA 222

Email & Calendar: Check your email **DAILY for electronic assignments**, additional information, and the Electronics Class Calendar (iCal on Macs, Outlook, and Google):

Class: Monday, Wednesday, and Friday
Sections x11 & x12- 0800 & 0900 Hours
Room: BR 303

Grading: Grades are based on homework, quizzes, and exams. The 2-hour final is comprehensive. Attendance is noted and graded. **Late work will NOT be accepted.**
STCW Requirements: A minimum grade of **C- (70 out of 100)** is needed to **PASS**
ATTENDANCE is mandatory and will be tracked to satisfy the STCW requirements.

Evaluation: Exams are based primarily on reading assignments and quizzes.

Quizzes (any time)	10%
Exam1	20%
Exam2	20%
Exam3	20%
Final (2 hour Comprehensive)	30%
Total Grade	100%

Engineering Course Objectives

At the completion of the course, the student will:

1. Understand the purpose and operation of common automatic control devices that are found aboard ships and in shore side industry.
2. Be familiar with the hardware and software used in industrial control.
3. Be prepared to troubleshoot and repair basic control system faults.

Operational Controls Syllabus

1 Fundamentals of Automatic Control

2 Automatic Controls Methods
- 1 ON-OFF Control
- 2 Sequential Control
- 3 Proportional-Integral-Derivative (PID) Control
- 4 Programmable Logic Control

3 Sensors and Measurement
- 1 Temperature
- 2 Pressure
- 3 Flow Rate
- 4 Level
- 5 Speed
- 6 Flame Sensors
- 7 Combustion Properties
- 8 Explosive Gases
- 9 Relative Humidity
- 10 Salinity
- 11 Dissolved Oxygen

4 Transmitters and Control Signals
- 1 Electrical
- 2 Pneumatic
- 3 Digital

5 Controller Mechanisms
- 1 Pneumatic
- 2 Electrical
- 3 Digital

6 Final Control Elements
- 1 Pneumatic Operators
- 2 Hydraulic Servomotors
- 3 Electric Servomotors