

Education and Training for Autonomous Shipping: Implications for a Maritime University

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*“Visiting Three Ports, Ferry Successfully
Completes Fully Autonomous Test in Norway”
– GCaptain, Nov 29, 2018*

Questions:

*How would our curriculum at Cal State
University Maritime Academy change if we
were to educate and train an autonomous
ship operator to work in an operations center?*

*Would such an operator need to be a USCG
Licensed Third Mate?*

Phase I: Multiple meetings with deck
officers/mechanical engineer with
autonomous engineering experience



MV Folgefonn



IHS Fairplay

Assumptions

- Shore control center
- Vessel operating from 'sea buoy' to 'sea buoy'
- Potential for simultaneous multiple ship operations
- B.S. Degree from four-year institution
 - General Education classes still required
- Not debating merits of manned/unmanned vessels
- Sheridan levels of autonomy varied depending on situation



TSL Australia.com



Fletcher technical community college Fletcher.edu

Two scenarios

1. USCG license still required
2. USCG license NOT required



1. USCG License Required: Core Competencies

- Navigation
 - Terrestrial (Basic nav/piloting)
 - Advanced (Sailings)
 - ECDIS (basic and advanced)
- COLREGS
 - Basic and advanced – how do autonomous ships behave?
- GMDSS
- Marine Engineering
 - Systems
 - Automation



<https://safety4sea.com/cm-bridge-procedures-what-to-do-in-the-case-of-ecdis-system-failure/>



<http://www.tototheo.com/news/gmdss-compliance-after-01-jan-2017>

1. USCG License Required: Core Competencies

- Automation
- Mechatronics Lab
- Electrical Power Systems
- Electronics
- Shiphandling
- Stability
- Radar/ARPA
- Cyber Security
 - identification, prevention, mitigation
- And additional classes already required for STCW and graduation



IEEE SPECTRUM /image/Mjg1NjA4Mw.jpeg

1. USCG License Required: *New Courses Needed*

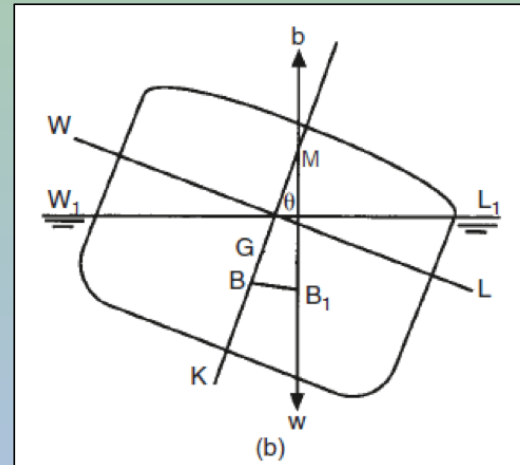
- More 'sea time' in simulators
- Automation systems
- Mechatronics lab
- Electrical power systems and lab
- Cyber security fundamentals: identification, prevention, mitigation



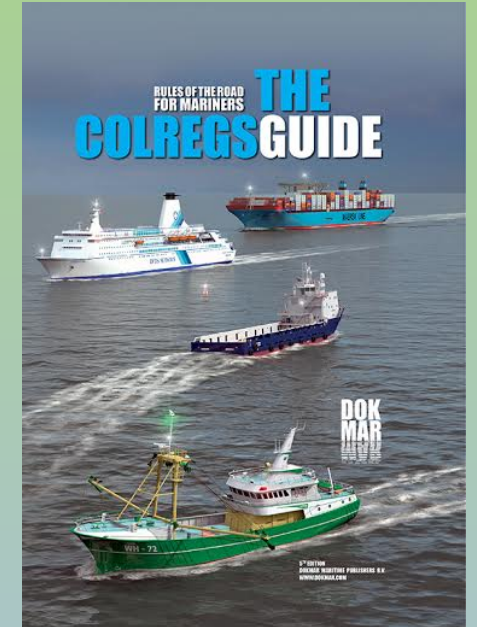
Yanko Designs Algorithmi 5

1. USCG License Required: *Courses Kept but Modified*

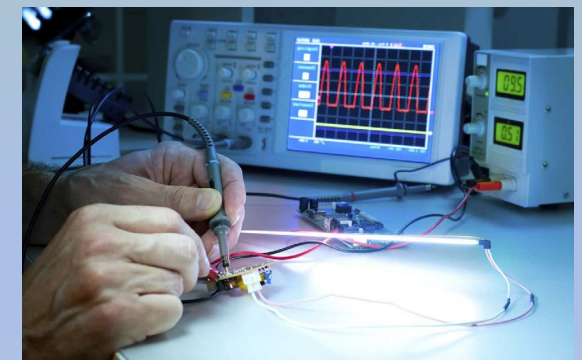
- Marine engineering systems
- Firefighting
 - Emphasis on fixed systems, strategies, less 'hose holding'
- Ship stability
 - Emergency operations
- COLREGS in an automated world
- Electricity/Electronics
 - More applied



Marine Insight



Dokmar

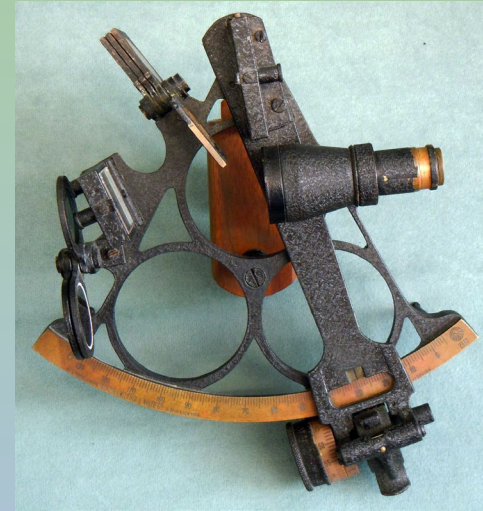


ICAT

2. NO USCG License:

Courses of questionable value (about 30 units)

- Celestial navigation
- Cargo vessel operations
- Marine survival/personal survival craft
- Port and terminal operations
- Shipboard medical
- Admiralty Law
- Ship operations/marine management lab
- Swimming
- Industrial equipment and safety
- Operational command at sea
- Elective courses e.g. Liquefied gas cargoes



Humboldt State University



Pixabay



Press publications

Implications

- 15 new units required under either scenario (one semester)
 - License program already impacted with 159 units
- Modification necessary to some existing courses
- Up to 30 units no longer needed with Non-License degree
 - Brings potential degree more in line with standard B.S. unit requirements
- Questions about new STCW competencies

Third Option...

A 'new' kind of USCG License?

- Geared toward autonomous operators
- Focus on necessary competencies
- Eliminate unnecessary skills

Next Steps

- Phase II – more discussions with industry advisory board, other experts
- Explore what a 'new' USCG License might look like, or even if necessary

Thank You

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