

CE / ISE / PPD 589: PORT ENGINEERING: PLANNING AND OPERATIONS

Summer 2014

3 Units + 1 Unit of CE 590 Directed Research (Instructor Approval Required)

Date/Time: May 24-25 (Saturday, Sunday), **9:00 AM – 5:00 PM**
May 30-31 (Friday and Saturday) 9:00 AM – 5:00 PM
June 21-22 (Saturday, Sunday) 9:00 AM – 5:00 PM
Students have three weeks for the term project

Class Room: **THH Room 112**

Instructor: Adjunct Assoc. Prof. Hanh D. Le-Griffin

Remote Office Hours:
Saturday 1:00 PM-2:00 PM
Via WebEx or Skype (TBD)

Campus Office: KAP 234A
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Course Overview:

This interdisciplinary course offers a comprehensive and detailed analysis of the technological applications, economics, and institutions that are collectively shaping a new and highly competitive environment for marine port operations. Port authorities, along with private terminal operators, shipping lines, rail companies, stevedore unions, and various service and logistics firms are adapting to rapid changes in their operating environments. Technological advances in marine engineering and information technologies are lifting the industry to ever-higher levels of operating efficiency. The physical form and managerial characteristics of ports are being rapidly altered in response to the strategic actions being taken by the various institutions that make use of and depend on marine port facilities and services.

The cumulative effect of these changes occurring in the shipping industry, particularly with the high-speed and high-capacity handling requirements of current mega container vessels, place an immense pressure on port authorities and terminal operators. This circumstance is particularly critical for regional gateway ports which frequently receive large vessels with capacities of 10,000 plus containers, such as the ports of Los Angeles and Long Beach. Given a scarcity of land and severe environmental constraints on terminal expansion, enhancing terminal productivity and efficiency through improved terminal planning, efficient management and advanced technology are essential to sustainable operation of the ports.

In this course the agents and issues now changing the operating environment of ports are examined and discussed, and the effects that these changes are likely to have on port and maritime terminals are analyzed to establish new requirements for terminal operating capacity and efficiencies that form the basis for port engineering design and development.

This course presents various container port topics pertaining to the principles of terminal planning and operations; statistical analysis and simulation techniques; intermodal transport and logistics services; safety and security; and environmental management and technological applications, including automation. Each topic covered is supported with case studies, practical examples and illustrations of the latest developments in the field. The primary focus of the course is on the planning and operation of container ports and terminals, together with discussions on other types of terminals, such as dry and liquid bulk as appropriate.

Topics Covered:

1. **Introduction of Modern Container Ports:** Concepts and definitions of physical and operational characteristics of modern container terminals and port systems, approaches to port operations and management in the context of world-wide production, global supply chains, and modern logistics and liner shipping.
2. **Port Terminal Planning:** Infrastructure and capacity, capacity evaluations, needs assessment and demand forecasting, operational terminal planning techniques.
3. **Port Operations—Part I:** Introduction to port operations and services, terminal layout and configuration, cargo handling processes, cargo handling equipment and developments in handling technologies.
4. **Port Logistics:** Network structure of port operations, freight logistics systems and ports, intermodality and landside port logistics, and integrating ports with global supply chains.
5. **Port Operations—Part II:** Terminal operations and capacity analysis including a multi-disciplinary approach to port performance, measurements of port productivity and efficiency, advanced cargo handling systems; and trends in container handling automation.
6. **Environmental Management and Ports:** Environmental aspects of port operations, public policy and industry stewardship in sustainable operating systems and advanced technologies.

Completion of this course will provide students with a thorough understanding of the institutional, economic, and technological forces that are now shaping the physical characteristics and service requirements of modern container terminals, and how these factors are included in the analysis of terminal capacity, operational performance, and engineering design of port and terminal features.

Audience: This course exists at the intersection of civil engineering, industrial and systems engineering, and urban planning, and serves multiple populations. It is appropriate for graduate students in the Viterbi, Price, and Marshall Schools. Students from programs offering 2- and 4- unit courses sometimes find 3-unit courses problematic with respect to degree requirements, and normally have the opportunity to register for a 1-unit directed research experience as an adjunct to this course. The instructor must approve the specific topic associated with the directed research experience. Students approved for a directed research complete additional work related to the course under the direction of the instructor.

Prerequisites: There are no specific prerequisites, although a familiarity with, or an interest in, marine container logistics, intermodal operations, and maritime transport will be helpful. Most graduate students in business, planning, economics, and engineering are equipped to complete the course successfully.

Course Requirements: This course is a combination of lectures and seminar-type classes. Students will be required to complete all reading and assignments prior to each class. In addition to class participation and periodic class assignments, course requirements include a group project, and a final exam.

Grades will be calculated as follows:

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| 1. Quiz and Class Participation, | 40%; |
| 2. Group Project, | 30%; |
| 3. <u>Final exam,</u> | <u>30%.</u> |
| Total: | 100% |

Texts: No textbook is required. Course readings are selected from a variety of books, journals, article, case studies, and government reports. Readings will be made available electronically via email. However, there are several text books that I recommend reading for an in depth understanding and analytical applications of this subject. These are available at USC Book Store:

1. Kim, Kap Hwan, and Hans-Otto Gunther, eds., (2007) *Container Terminals and Cargo System: Design, Operations Managements and Logistics Control Issues*, Springer. Highly recommended if you are interested in modeling and operations research.
2. Bichou, Khalid (2009) *Port Operations, Planning and Logistics*, Informa, London.

Communication: All class related information, assignments and reading materials are sent directly to students via USC email or registered @gmail.com account (e.g. CEE589.legriffin@gmail.com) for large attachment files. Class's Power Point handouts will be made available to you beginning of each class. For matters that requires an immediate response, USC email ([hdl@usc.edu](mailto:hdle@usc.edu) cc: le.griffin@arcadis-us.com) is the best way to communicate.