

Course Syllabus of Innovative Ship Design

Announcements:

Please note that all lectures, assignments, exams and term projects for this course are **in English**, except the Ship Design Contest.

1. Class Information

Class: Innovative Ship Design

Semester: Spring 2012

Time: Mon. 13:00-14:50 p.m., Wed. 13:00-14:50 p.m.

Location: Room 112, Bldg. 34

Instructor: Prof. Kyu-Yeul Lee

Office: Room 208, Bldg. 34, E-mail: kylee@snu.ac.kr, Phone: (02)880-7327

Office Hours: Available before school and after school by appointment.

Teaching assistants:

Main assistant: Sol Ha (E-mail: hasol81@snu.ac.kr)

Other assistant: Namkug Ku (E-mail: knk80@snu.ac.kr)

Office: Room 308, Bldg. 34, Phone: (02)880-8378

2. Course Topics and Description:

1) Procedures and methods of the basic ship design process are introduced: Determination of ship's principal dimensions, Estimation of weight, Estimation of cargo hold volume, Calculation of freeboard, Prediction of resistance, speed and power, Determination of propeller principal dimensions, Selection of main engine, Hull form design by hull form variation method, General arrangement design, Naval architectural calculation such as volume, hydrostatics, trim & stability, subdivision & damage stability(SDS), longitudinal strength, Midship section structural design, Grillage analysis for Hull Structure.

And "Dynamic Analysis and Control of Heave Compensation System for Offshore drilling Operations" is also introduced.

2) Students have to work in team, consisting of 5 to 6 students, on two term projects for given owner's requirements. **The 1st term project** is a **conceptual design** of a container ship based on the given basis container ship and is obligatory for all students. After completing the conceptual design, students can then either join the "**Ship Design Contest**" or continue their 1st term project and start the 2nd term project handling the **basic design** of the container ship. The teams who are participating in the ship design contest will be favored in their grading.

3. Term Projects Description

1) Projects Description

① 1st Term Project

- Due date: **April, 20th (Fri), 23:00**

- Presentation of 1st term project: **April, 21st (Sat), 10:00~18:00**

- “**Conceptual design of a container ship** based on the given basis container ship”:

Contents: Determination of principal dimensions, performance calculation, hull form design, general arrangement design

② 2nd Term Project

- Due date: **June, 1st (Fri), 23:00**

- Presentation of 2nd term project: **June, 2nd (Sat), 10:00~18:00**

- **Basic design of the container ship** including final hull form design, final general arrangement design, trim & stability calculation, Midship section structural design and grillage analysis based on the FEM.

Or

- **Ship Design Contest:**

Ship design contest organized by the Society of Naval Architects of Korea

Two teams shall join the contest. One team will work on an assigned topic, whereas the other team will work on a free theme. Both teams who are participating in the ship design contest will be favored in their grading.

2) Work Scope

① **Group A:** Students who participate in the ship design contest.

- Work Scope: **Conceptual design** of a container ship (1st term project),
- **Ship Design Contest**

② **Group B:** Students who do not participate in the ship design contest.

- Work Scope: All contents of the 1st and 2nd term project

4. Lecture notes and References

1) Lecture notes(hand out):

- Lee, Kyu-Yeul, “Innovative Ship Design” in English, Seoul National University, Spring 2012.

2) References:

- Lee, Kyu-Yeul, Open Course Ware(OCW) “Innovative Ship Design” in Korean, Seoul National University, Spring 2009.

- Parson, M. G., NA470 Ship Design & NA570 Advanced Marine Design,
- Schneekluth, H. & Bertram, V., Ship Design For Efficiency And Economy, 2nd Edition, Butterworth-Heinemann 1998.

5. Grade Computation

- 1st Exam: 15%
- 2nd Exam: 15%
- Final Exam: 15%
- Term Projects¹⁾: 45%
- Attendance and activities during class time²⁾: 10%

1) All students have to turn in their term projects by **due date**.

2) Students should answer the question of the instructor correctly during class time.

Most instructions will be made only on the website, so check it frequently.

Website: <http://asdal.snu.ac.kr>

Week	Parts	Regular Lectures				Supplementary Lectures	
		Monday		Wednesday		Thursday	
		Date	Time: 13:00-14:50	Date	Time: 13:00-14:50	Date	Time: 18:00-20:50
1	Conceptual Ship Design Equations	3/5	Buoyancy and Static Equilibrium Hydrostatic Pressure, Force and Moment on a Floating Body	3/7	The Weight Equations The Volume Equations	3/8	
2		3/12	The Weight Equations The Volume Equations	3/14	Freeboard Calculation	3/15	
3		3/19	Speed-Power Prediction - Propeller Selection	3/21	Speed-Power Prediction - Main Engine Selection	3/22	- Propeller Selection - Main Engine Selection
4		3/26	General Arrangement Design	3/28	General Arrangement Design	3/29	
5		4/2	Hull Form Design by Variation Method	4/4	Hull Form Design by Variation Method	4/5	Computer Aided Hull-Form Design by using EzHULL
6	Equations of Ship Stability	4/9	Classical Hydrostatics - Transverse Restoring Force and Moment	4/11	Classical Hydrostatics - Longitudinal Restoring Force and Moment	4/12	Computer Aided Compartment Arrangement Design by using EzCOMPART
7		4/16	Deterministic Damage Stability	4/18	Deterministic Damage Stability	4/19	
8		4/23	Probabilistic Damage Stability(SDS)	4/25	Probabilistic Damage Stability(SDS)	4/26	Probabilistic Damage Stability(SDS)
9		4/30	Computational Ship Stability - Governing Equations of Hydrostatics	5/2	Computational Ship Stability - Governing Equations of Hydrostatics	5/3	
10		5/7	Computational Ship Stability - Governing Equations of Hydrostatics	5/9	Computational Ship Stability - Governing Equations of Hydrostatics	5/10	Computational Ship Stability - Governing Equations of Hydrostatics
11	Equations of Ship Structural Design	5/14	Ship Structural Design - Beam Theory	5/16	Ship Structural Design - Longitudinal Strength	5/17	
12		5/21	Ship Structural Design - Midship Section Rule Scantling	5/23	Ship Structural Design - Local Scantling - Buckling	5/24	Midship Section Rule Scantling
13		5/28	석가 탄신일(공휴일)	5/30	Grillage Analysis for a Hull Structure	5/31	Grillage Analysis for a Hull Structural Design
14	Conceptual Design of a Floating Offshore Wind Turbine	6/4	Dynamic Analysis and Control of Heave Compensation System for Offshore Drilling Operations	6/6	현충일	6/7	Ship Structural Design - Waveloads - Ocean Wave Generation
15		6/11	Dynamic Analysis and Control of Heave Compensation System for Offshore Drilling Operations	6/13	Dynamic Analysis and Control of Heave Compensation System for Offshore Drilling Operations	6/14	

	1 st Exam	2 nd Exam	Final Exam
Date	March 24 th , 2012 (Saturday), 13:00~16:00	May 12 th , 2012 (Saturday), 13:00~16:00	June 14, 2012 (Thursday), 18:00~21:00
Range of Exam	Conceptual Ship Design Equations	Classical Hydrostatics, SDS(Subdivision and Damage Stability), Computational Ship Stability,	Ship Structural Design, Dynamic Analysis and Control of Heave Compensation System for Offshore Drilling Operations