Course Syllabus

1. Class Information

- **Class Title**: Computer-Aided Ship Design
- **Class Number**: 414.437(3 Credits)
- **Semester**: Fall 2013
- **Level of Course**: Undergraduate / Junior
- **Time**: Tue. 09:00-10:50 a.m., Thu. 09:00-10:50 a.m.
- **Location**: Room 106, Bldg. 34
- **Instructor: Prof. Myung-Il Roh**
  Office: Room 205, Bldg. 34
  E-mail: miroh@snu.ac.kr
  Phone: (02)-880-7328
  Office Hours: Available before school and after school by appointment
- **Teaching assistants: Ki-Su Kim**
  E-mail: kisu2511@snu.ac.kr
  Office: Room 312, Bldg. 34
  Phone: (02)-880-8378
- **Language of Instruction**: English

※ **Announcement**: Please note that all lectures, assignments, exams, and term projects for this course are in English.

2. Course Topics and Description

The course deals with the basic mathematical model and computational procedure for ship and offshore plant design. The course consists of two parts:

- Part I: Optimization method - Determination of optimal principal dimensions of a ship
- Part II: Curve and surface modeling - Ship hull form modeling

Term Project: (1) Programming for the determination of optimal principal dimensions of a ship by using a constrained optimization method (2) Programming for ship hull form modeling by using B-Spline curve and surface.

3. Text Book and Reference

(1) Textbook

- Roh, Myung-Il, Lecture Note for “Computer Aided Ship Design”, Seoul National University, Fall, 2013

(2) Reference

- Lee, Kyu-Yeul, Roh, Myung-Il, Lecture Note for “Innovative Ship Design”, Seoul National University, Fall, 2013
- Part I: Arora, J.S., “Introduction to Optimum Design”, 2nd Ed., Elsevier Academic Press, 2004
- Part II: Farin, G., and Hansford D., “The Essentials of CAGD”, AK Peters, Ltd., 2000

4. Grade Computation

Weighted system is as follows:

- Two Exams: 50%
- Two Term Projects: 40%
- Attendance: 10%

In case of an excused absence, the student must make-up any missed test, quiz or homework on the following day during a free period, before or after school. Unexcused absences will result in a zero.

5. Website: http://etl.snu.ac.kr

Most assignments, instructions and notice for supplementary lecture will be made only on the website, so check it frequently.

6. Class Expectations

- All lectures, assignments, exams and term projects for this course are presented in English.
- Late work will be not accepted.
- Show respect to others and their property.
- Come prepared to class.
- It is required to make appointments to see instructor during office hours. Send email for an appointment at least one day in advance.

7. Exam

	Mid-term exam	Final exam
Date	October 24th, 2013 (Thursday), 09:00~10:50	December 12th, 2013 (Thursday), 09:00~10:50
Range of Exam	Part 1: Optimization method	Part 2: Curve and surface modeling

8. Course Schedule

Week	Part	Course Schedule				Term Project
		Tuesday		Thursday		
		Date	Time: 09:00~10:50	Date	Time: 09:00~10:50	
1	**Optimization Method**	09/03	Introduction to Optimal Design Unconstrained Optimization Method - Gradient Method(Steepest Descent Method, Conjugate Gradient Method)	09/05	Unconstrained Optimization Method - Gradient Method(Newton's Method, Davidon-Fletcher-Powell(DFP) Method, Broyden-Fletcher-Goldfarb-Shanno(BFGS) Method)	Term project 1: Programming for determination of optimal principal dimensions of a ship by using a constrained optimization method (Due date: Thursday, October 31)
2		09/10	Unconstrained Optimization Method - Direct Search Method - 1-dimensional Search Method(Golden Section Search Method) - n-dimensional Search Method(Hooke & Jeeves Method, Nelder & Mead Method)	09/12	Constrained Optimization Method - Kuhn-Tucker Necessary Condition	
3		9/17	Constrained Optimization Method - Lagrange Multiplier	9/19	**Holiday**	
4		9/24	Constrained Optimization Method - Penalty Function Method	9/26	Constrained Optimization Method - Linear Programming (1)	
5		10/01	Constrained Optimization Method - Linear Programming (2)	10/03	**Holiday**	
6		10/08	Constrained Optimization Method - Sequential Quadratic Programming (SQP) (1)	10/10	Constrained Optimization Method - Sequential Quadratic Programming (SQP) (2)	
7		10/15	Determination of Optimal Principal Dimensions of a Ship	10/17	Programming Guide for Golden Section Method and Direct Search Method	
8		10/22	Programming Guide for Penalty Function Method and Term Project 1	10/24	**Mid-term Exam**	
9	**Curve and Surface Modeling**	10/29	Introduction to Curve and Surface Modeling	10/31	Bezier Curves and de Casteljau Algorithm	Term project 2: Programming for ship hull form modeling by using B-Spline curve and surface (Due date: Thursday, December 19)
10		11/05	B-Spline Curves and de Boor/Cox-de Boor Algorithm (1)	11/07	B-Spline Curves and de Boor/Cox-de Boor Algorithm (2)	
11		11/12	B-Spline Curve Interpolation (1)	11/14	B-Spline Curve Interpolation (2)	
12		11/19	Bezier Surfaces (1)	11/21	Bezier Surfaces (2)	
13		11/26	B-Spline Surfaces (1)	11/28	B-Spline Surfaces (2)	
14		12/03	Programming Guide for B-Spline Curve	12/05	Programming Guide for B-Spline Surface	
15		12/10	Programming Guide for Term Project 2	12/12	**Final Exam**	