C·O·S·T ENGINEERING II

ECONOMICS OF SATELLITES, ROCKETS AND SPACE ORGANIZATIONS

GENERAL: This lecture is part of COE Program. The 21st Century Center of Excellence Program was started by Japanese government to support activities of those universities aiming to become international centers for top-level research and studies. This is a Ph.D. course, but master's or bachelor's students are also welcome. Transfer of credits to other universities on request. Visitors are always welcome!

DESCRIPTION: The aim for this topic is to increase the awareness of aerospace and non-aerospace students for economical optimization of satellites, rockets and space organizations. Economical optimization of commercial, national security and scientific space systems will be an essential key point for a future growing space market. Cost Engineering means to take costs as a main decision criterion for the whole program duration into account. If applied all strategies, the cost of projects could be reduced drastically of the traditional Business as Usual costs.

WHERE: Keio University, Yagami Campus, Department of System Design Engineering, Lecture Room No. 12-104 (building 12 at 1. floor), 3-14-1 Hiyoshi, Kohoku-ku, Yokohama 223-8522

WHEN: Every Wednesday, 16:30 – 18:00 (first class: April 13, 2005)

BIOGRAPHY: Robert A. Goehlich was born in Berlin, Germany, in 1975. He received his Ph.D. in Aerospace Engineering from Technical University Berlin. His investigations are focused on cost engineering (economical optimization of vehicle systems, aerospace industry and organizations) and space tourism. He worked at Israel Institute of Technology (Israel), University of Washington (USA), National Aerospace Laboratory (Japan), Kourou Spaceport (French Guiana). Currently, he is lecturing “Space Tourism II” and “Cost Engineering II - Economics of Rockets, Satellites and Space Organizations” at Keio University and working at JAXA in Japan.

CONTACT:

Dr.-Ing. Robert A. Goehlich
Keio University
Department of System Design Engineering
Yoshida/Ohkami Laboratory
3-14-1 Hiyoshi, Kohoku-ku
Yokohama 223-8522, JAPAN

email: mail@Robert-Goehlich.de
Mobile: +81-(0)90-1767-1667
Fax.: +81-(0)45-566-1778
Internet: www.Robert-Goehlich.de

SCHEDULE:

Week	Date	Topic	Short Description
1	13.4.	Introduction	short summary of each lecture, definition of cost engineering, requests from audience for lectures
2	20.4.	Basics about Orbital Mechanics and Design of Satellites	Newton's laws, Kepler's laws, Hohmann transfer, the n-body problem, rocket equation, atmospheric entry, aerobraking, mission design, propulsion, configuration, structural design, power systems, thermal management, systems integration
3	27.4.	Basics about Rocket Science and Space Transportation Systems	rocket equation, delta velocity, Earth's atmosphere, solar system, Newton's laws, Kepler's laws, expendable versus reusable rockets, single-stage versus multi-stage rockets, propulsion technology, typical ascent/descent trajectory, spaceports
4	11.5.	Basics about Space Organisations	Introduction to agencies such as NASA, ESA, JAXA, etc., companies such as Arianespace, EADS, Boeing, Kawasaki Heavy Industries etc.
5	18.5.	Microeconomics in 3 hours (Part I)	Maximizing profits, efficiency, role of knowledge, market structure, organizational architecture, outsourcing, TQM, ethics
6	25.5.	Microeconomics in 3 hours (Part II)	Elasticity, demand, marginal revenue, monopolistic competition, Pareto optimality, price discrimination, returns to scale,
7	1.6.	Macroeconomics in 3 hours (Part I)	Financial markets, fiscal policy, economic catastrophes, banks, labor market, recession, central planning
8	8.6.	Macroeconomics in 3 hours (Part II)	Gross Domestic Products, portfolio choice, prisoner's dilemma, self-interest, balance of payments, budget constraint
9	15.6.	Strategies to Reduce Cost	Cost of governmentally contracted projects (Business as Usual) may be reduced drastically under favorable conditions (Smart Business), which are discussed here (e.g. timing, type of contract, annual funding profile, etc.)
10	22.6.	Case Study of a Typical Scientific, Commercial and National Security Satellite	life-cycle costs, discussion about which strategies should be applied to which type of satellite
11	29.6.	Case Study of a Typical Rocket	discussion of main cost items caused by launch service, rocket life-cycle costs versus satellite life-cycle costs
12	6.7.	Case Study of a Typical Space Organisation	national versus international organisations, small versus large organisations
13	13.7.	Conclusion	outlook, feedback

Note: Schedule is based on 90 minutes lecture/week.
It is advisable to bring a pocket calculator for this class.