LEON H. CHARNEY
SCHOOL OF MARINE SCIENCES
בית הספר למדעי הים על שם ליאון צ׳רני

אוניברסיטת חיפה
University of Haifa
جامعة حيفا

THE HATTER DEPARTMENT
OF MARINE TECHNOLOGIES
החוג לטכנולוגיות ימיות ע״ש האטר

Inertial Navigation Systems

Instructor: Dr. Itzik Klein   kitzik@univ.haifa.ac.il

Course description: A graduate-level course on inertial navigation systems (INS) theory and applications.

Syllabus:

Part 1 - Introduction

- The art of navigation.

Part 2 - Inertial Sensors

- Inertial measurement unit.

- Sensor calibration.

Part 3 - Navigation Mathematics

- Reference and coordinate frames.

- Frame transformations.

- Quaternions.

Part 4 -   Navigation Systems

- Navigation equations of motion.

- Alignment.

- Simplified error models.

Part 5 - Underwater navigation

- Doppler velocity log.

- Autonomous underwater vehicle navigation.

Requirements:

The students are required to submit homework assignments with a detailed description of their work and results (20% of the final grade). The final assignment will include reading several papers, reconstructing main paper results, writing a review and presenting the subject in class (80% of the final grade).

Textbooks:

- Titterton D. H. and Weston J. L., Strapdown inertial navigation technology – second edition, The American institute of aeronautics and astronautics and the institution of electrical engineers, 2004
- P. D. Groves, Principles of GNSS, inertial and multisensor integrated navigation systems, Artech House, 2013.