SHIP AND SUBMARINE SIGNATURES
JUNE 20– JUNE 24, 2011

LECTURER-IN-CHARGE: Dr. Paul C. Shang, Head, Signatures Integration Group, Naval Surface Warfare Center, Carderock Division (NSWCCD)

TUITION: $1800.00

DAILY CLASS ROUTINE:

Monday: Classroom facility opens at 0730 and will be secured at 1700. Class begins at 0800 and ends at 1700 with a 1 hour break for lunch. Class Dinner, hosted by MIT, begins at 1700 and ends at 1900.

Tuesday: Classroom facility opens at 0730 and will be secured at 1700. Class begins at 0800 and ends at 1700 with a 1 hour break for lunch.

Wednesday: Classroom facility opens at 0730 and will be secured at 1700. Class begins at 0800 and ends at 1700 with a 1 hour break for lunch.

Thursday: Classroom facility opens at 0730 and will be secured at 1700. Class begins at 0800 and ends at 1700 with a 1 hour break for lunch.

Friday: Classroom facility opens at 0730 and will be secured at 1200. Class begins at 0800 and ends at 1200.

COURSE DESCRIPTION AND OBJECTIVE: The objective of this course is to provide the student with a fundamental understanding of ship and submarine signatures. Signatures are the energy emitting and reflecting characteristics that are used for detection, classification and targeting. Basic theory, threats, signature examples, modeling and reduction techniques will be presented. Radar, infrared, magnetic and acoustic ship signatures and acoustic and magnetic submarine signatures will be covered. Principles and techniques will be brought together in problem sets and design projects. The following topics will be covered:

- Topside Signature Technology Overview
- Underwater Electro-Magnetic Signatures
- Radar Signatures
- Infrared Signatures
- Structural Acoustics
- Hydro-Acoustics
- Acoustic Target Strength
- Propulsor Acoustics
- Submarine Acoustics and Measurements

LECTURERS
Dr. Paul C. Shang
Head, Signatures Integration Group, Naval Surface Warfare Center, Carderock Division (NSWCCD)

Dr. Jason Anderson
Senior Scientist, Propulsor Acoustics

Dr. Mathew A. Craun
Senior Scientist, Structural Acoustic Control Technology, NSWCCD

Mr. David L. Etherton
R&D Program Manager, Electro-Magnetic Signatures Technology Division, NSWCCD

Dr. Theodore M. Farabee
Senior Scientist, Hydroacoustic Control Technology, NSWCCD
Dr. John J. Holmes  Senior Scientist, Underwater Electromagnetic Signature Control Technology, NSWCCD
Mr. Robert Kollars  Head, Signatures Characterization & Analysis Division, NSWCCD
Mr. John W. Maxwell  Senior Scientist, Acoustic Target Strength Control Technology, NSWCCD
Mr. William T. Stephens  Program Manager, Radar Signature Technology, NSWCCD
Mr. Richard W. Warfield  Program Manager, Survivability Division, NAVSEA

Special Note: This course contains material governed by Distribution Statement D. Distribution authorized to the Department of Defense and U.S. DoD contractors only. Other requests shall be referred to NAVSEA 05P1 via the Lecturer-in-Charge, Dr. Paul C. Shang.

GENERAL INFORMATION

LOCATION: Classes will be held in the Hill Building, Building NE-80, Room 1409 at One Hampshire, Cambridge, MA. The classroom is adjacent to MIT's main campus at The Charles Stark Draper Laboratory. An interactive MIT campus map is available on-line at http://whereis.mit.edu/.

COURSE ELIGIBILITY AND CLASSIFICATION: Applicants are expected to have mature technical backgrounds which, either through experience or education is at least equivalent to graduate education. This course is classified SECRET/NOFORN. A final SECRET security clearance is required. The course is open to U.S. active-duty military, U.S. Department of Defense employees, and U.S. civilian contractor personnel with U.S. Department of Defense sponsorship. It is not open to foreign nationals. A U.S. Government ID or Passport will be required each day to obtain a badge for classroom access.

APPLICATION AND TUITION PAYMENT: Course enrollment is limited. Applications AND tuition payment are due THREE (3) weeks prior to the first day of the course. Applications may be submitted electronically (e-mail to profsum@mit.edu), by fax ((617) 753-4962), or by mail to the following address:

Massachusetts Institute of Technology
Department of Mechanical Engineering
77 Massachusetts Avenue, Room 5-317
Cambridge, MA 02139-4307
Attn: Mary Mullowney

Course tuition is $1800.00 and payment must be made in full with the application. You will not be enrolled in the course until payment is received. Payment can be made by check, payable to MIT Account #1541101, and mailed to the address above or on-line by credit card at http://web.mit.edu/2n/profsum/Pro_Summer_Payment.html.

Students will receive confirmation of course enrollment AFTER receipt of their application and tuition payment. Those applicants who will not be enrolled will receive a refund of their tuition payment.

CANCELLATION: Cancellations within ONE (1) week of the first day of the course will be subject to a $100.00 charge. Substitution by another applicant will be allowed provided an application is received and their security clearance is processed by Draper Laboratory.

ACCOMMODATIONS: Course tuition DOES NOT include accommodations. Each student must arrange their own transportation and hotel accommodations. Hotel space in Cambridge is very limited during the summer, so early advance reservations are strongly recommended. A block of hotel rooms at the government per diem rate has been reserved at the Cambridge Marriott. Reservations can be using the following link: http://www.marriott.com/hotels/travel/boscb?groupByCode=ot0ot0a&app=resvlink&fromDate=6/19/11&toDate=
The block of rooms will only be held up to **FOUR (4) weeks prior to the first day of the course.** The hotel is within walking distance of The Charles Stark Draper Laboratory, and provides convenient access to the MBTA Red Line at the Kendall/MIT station. Car rental is neither necessary nor recommended.

**STUDENT ATTIRE:** Casual (Business attire is neither required nor desired).

**REFRESHMENTS:** Continental breakfast will be provided in the morning and a light snack each afternoon. Lunch will be provided on those days when working lunches/guest speakers are scheduled.

**EMERGENCY CONTACT INFORMATION:** During class, students can be contacted by leaving a message with Lisa Kelleher at (617) 258-4928 or by e-mail to lkelleher@draper.com.

**PORTABLE ELECTRONIC DEVICES:** This course is CLASSIFIED and as such the classroom will be managed as a CLOSED AREA. Among other restrictions, this means that no recording devices or electronic devices will be allowed into the room. Arrangements for students requiring a medical assist electronic device must be made **THREE (3) weeks prior to the first day of the course** by contacting Lisa Kelleher at Draper Laboratory at lkelleher@draper.com.

Examples of portable electronic devices include: laptops, PDAs, iPods, calculators, cell phones, cameras, remote car keys, and flash drive memory sticks. *Note: this is not an all-inclusive list.*

A guarded storage area outside the classroom will be provided for any personal electronic devices brought to the facility.

**VISIT REQUESTS:** Visit requests should be sent to the attention of Lucy Rodrigues **THREE (3) weeks prior to the first day of the course.** Visit requests **MUST** include the following or the request will not be processed: valid dates (length of the course only NOT the entire year); name of the course; and indicate you are attending as a student. JPAS is the preferred method for visit requests. Draper’s JPAS number is 51993-4. Visit requests may also be faxed or mailed to the following:

The Charles Stark Draper Laboratory, Inc.  
555 Technology Square  
Cambridge, MA 02139-3563  
Attn: Lucy Rodrigues, Room 2194D

Fax number: (617) 258-2000

The security protocols in place at the Draper facility may be slightly different than those at your place of employment, so if you would like a detailed Security briefing prior to your arrival, please contact Lucy Rodrigues at (617) 258-2413 for arrangements.

Professional Summer Internet Web Site: [http://web.mit.edu/2n/profsum](http://web/mit.edu/2n/profsum)