

	12-Feb-18	13-Feb-18	14-Feb-18
8:30-0900	<b>REGISTRATION</b>		
09:00-09:15	<b>OPENING REMARKS</b>	<b>MOTION PLANNING, GUIDANCE, &amp; CONTROL</b> INTRODUCTION TO LINEAR AND NONLINEAR CONTROL THEORY	<b>CONTROL OF INTERVENTION VEHICLES</b> <i>ROBOTS AND MANIPULATORS</i>
09:15-10:30	<b>INTRODUCTION &amp; MOTIVATION</b> <i>Scientific and commercial challenges, Current trends, from functional to technical specifications</i>	<i>Linear versus nonlinear control; frequency domain and time-domain optimal control; Basics of non-linear control (Lyapunov theory, Input-to-State Stability; Lyapunov-based control systems design)</i>	
10:30-10:45	COFFEE BREAK	COFFEE BREAK	COFFEE BREAK
10:45-12:00	<b>MARINE SCIENCE, TECHNOLOGY &amp; INNOVATION</b> <i>Geotechnical surveys using networks of autonomous marine robots Coral Reef Monitoring</i>	<b>SINGLE VEHICLE GUIDANCE AND CONTROL</b> <i>Pose Control, Trajectory tracking, Path following</i>	<b>CONTROL OF INTERVENTION VEHICLES</b>
12:00-13:00	LUNCH BREAK	LUNCH BREAK	LUNCH BREAK
13:00-14:15	<b>UNDERSTANDING THE DYNAMICS OF MARINE VEHICLES</b> <i>General equations of motion; kinematics and dynamics; hydrodynamics and hydrostatics</i>	<b>MULTIPLE VEHICLE GUIDANCE AND CONTROL</b> <i>Cooperative path following; Cooperative trajectory tracking; Acoustics network-enabled cooperative control; Formation control</i>	<b>NAVIGATION SYSTEMS</b> INTRODUCTION TO NAVIGATION OF MARINE VEHICLES
14:15-15:30	<b>UNDERSTANDING THE DYNAMICS OF MARINE VEHICLES</b> <i>Actuators and sensors; Model identification; Illustrative vehicle models</i>	<b>OBSTACLE DETECTION AND AVOIDANCE, BOUNDARY MAPPING / SOURCE LOCALISATION</b>	<b>INTRODUCTION TO NAVIGATION OF MARINE VEHICLES</b>
15:30-15:45	COFFEE BREAK	COFFEE BREAK	COFFEE BREAK
15:45-17:30	<b>DYNAMICAL SYSTEMS ANALYSIS AND DESIGN</b> <i>Mathematical tools for dynamical systems analysis and design: an Introduction A laymans' overview of Motion Planning, Navigation, Guidance, and Control. Capturing systems performance in a mathematical setting; Linear and nonlinear systems; Linearization techniques; Frequency domain and state-space descriptions</i>	<b>SINGLE AND COOPERATIVE MOTION PLANNING</b> <i>Motion planning techniques Application examples, including Cooperative motion planning</i>	<b>ADVANCED NAVIGATION TECHNIQUES</b> <i>Single Range Localization; Observability analysis; Filter design and robustness issues Introduction to Geophysical (Terrain and Geomagnetic) based navigation VISIT to the MARINE ROBOTICS LAB of NIO 1745 - 1815</i>

	15-Feb-18	16-Feb-18	17-Feb-18
8:00-9:00			ACOUSTIC Demos in water
9:00-10:30	<b>ADVANCED NAVIGATION TECHNIQUES</b> <b>Nonlinear Filters</b> <i>(Monte Carlo techniques, Particle Filters)</i> <i>Vision and Sonar-based Simultaneous Localization and Mapping (SLAM)</i>	<b>New Technologies on the Horizon</b> Long term Stationary Systems (SREP) <b>09:00 – 09:30</b> Ocean Observation Systems <b>09:30 – 10:00</b> ROV Startup - a Story <b>10:00 – 10:30</b>	
10:30-10:45	COFFEE BREAK	COFFEE BREAK	COFFEE BREAK
10:45-12:00	<b>SLAM 10:45 – 11:30</b> <b>SYSTEMS IMPLEMENTATION 11:30 - 12:00</b> <i>Going from theory to practice: an introduction to Hardware and Software systems; Computer systems; communications Systems</i>	<b>New Technologies on the Horizon</b> Bio-inspired Marine Robots <b>10:45 - 11:30</b> Pressure Compensated Systems (Manta-ray) <b>11:30 – 12:00</b>	Vehicle demos in water
12:00-13:00	LUNCH BREAK	LUNCH BREAK	FAREWELL
13:00-14:15	<b>SYSTEMS IMPLEMENTATION</b> <i>ROS as a unifying software tool for middleware systems implementation; Systems for single and multiple vehicle mission programming and execution</i> <i>Networked HIL simulation tools,</i>	<b>ACOUSTIC NETWORKS</b> <i>Theory: Acoustic communications; Acoustic network systems for single and cooperative navigation and control (theory and practical results from several EU and German projects).</i>	
14:15-15:30	<b>NETWORKED HIL SIMULATION TOOLS</b>		
15:30-15:45	COFFE BREAK	COFFE BREAK	
15:45-17:30	<b>New Technologies on the Horizon</b> Deep Sea Vehicles - Commercial aspects <b>15:45 – 16:15</b> Autonomous Ships <b>16:15 – 17:00</b> Buoyancy Driven Deep Sea Vertical Profiler <b>17:00 - 1730</b>	<b>Acoustic Networks: “Dry” demos</b> <i>using modem emulators and environment simulators</i>	
<b>1730 - 1800</b>		<b>Closing Ceremony</b>	