

## **RIME 837: Simultaneous Localization and Mapping**

### **Textbook**

1. Probabilistic Robotics. By Sebastian Thrun, Wolfram Burgard, and Dieter Fox, MIT Press (2006)  
ISBN: 978-0-262-20162-9.

### **Reference Book**

2. Introduction to Autonomous Mobile Robots. By Roland Siegwart and Illah R. Nourbakhsh, The MIT Press, 2004. ISBN-10: 0-262-19502-X, ISBN-13: 978-0-262-19502-7. Handouts and research articles may also be used by the instructor.

### **Objective**

3. This course focuses on Robot Localization and Mapping in unknown or partially known environments.

### **Course Outcome**

4. This course will furnish the students with practical knowledge of SLAM algorithms required for mapping and navigation in unknown or partially known environments.

### **Course Outline**

Topics	Allocated Periods
<b><u>Introduction to the Simultaneous Localization and Mapping (SLAM) Problem</u></b> <b><u>SLAM with Extended Kalman Filter</u></b> <ul style="list-style-type: none"><li>· SLAM with Known Correspondences</li><li>· SLAM with Unknown Correspondences</li></ul> <b><u>SLAM with Particle Filter</u></b> <b><u>Graph-based SLAM</u></b> <b><u>Biologically-inspired SLAM Solutions</u></b> <ul style="list-style-type: none"><li>· RatSLAM</li></ul> <b><u>Loop-Closure in SLAM</u></b> <b><u>Hierarchical SLAM</u></b> <b><u>SLAM Using Vision</u></b> <ul style="list-style-type: none"><li>· Monocular SLAM</li><li>· Stereo and Multi-camera SLAM</li><li>· SLAM using Catadioptric Sensors<sup>1</sup></li></ul> <b><u>Underwater SLAM</u></b>	45

**SLAM for UAVs (Unmanned Aerial Vehicles)**

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