Course Description:

An important and popular topic in robotics is the self-localization and mapping problem (SLAM). In SLAM the robot operates in an unknown and static environment and tries to estimate its pose (position and orientation) while at the same time building a map of its environment. Topics of this course include: robot motion and perception (i.e. through electro-optical or laser scanning sensors); recursive state estimation (i.e. Bayesian filters); a short reference to Gaussian filters; nonparametric filters such as the particle filter; mobile robot localization using Markov, Gaussian Grid and Monte-Carlo methods; occupancy grid mapping, SLAM, GraphSLAM, FastSLAM and Sparse Extended Information filters. The course will be project-oriented.
**Textbook:**

*Probabilistic Robotics*
Sebastian Thrun, Wolfram Burgard, Dieter Fox
The MIT Press, August 19, 2005

**Recommended Reading:**

*Introduction to Autonomous Mobile Robots*
Roland Siegwart, Illah R. Nourbakhsh, Davide Scaramuzza

*Beyond the Kalman Filter – Particle Filters for Tracking Applications*
Branko Ristic, et al
Artech House

*Principles of Robot Motion: Theory, Algorithms, and Implementations*
Howie Choset, Wolfram Burgard, Lydia Kavraki, George Kantor, Seth Hutchinson, K. Lynch.

*FastSLAM: A Scalable Method for the Simultaneous Localization and Mapping Problem in Robotics*
Michael Montemerlo, Sebastian Thrun

*3D Robotic Mapping: The Simultaneous Localization and Mapping Problem with Six Degrees of Freedom,*
Andreas Nuechter

*Statistical Sensor Fusion*
Fredrik Gustafsson
Studentlitteratur 2010

**Class Website:**

Materials, links, course notes, assignments and projects can be found on my website:

[www ohio edu people uijtdeha/](http://www.ohio.edu/people/uitdeha/)

**Class:**
Tuesday, Thursday 3:05PM to 4:25PM

**Classroom:**
ARC 140

**Office Hours:**
Tuesday, Thursday 10:00AM to 11:00AM
**Attendance Policy:**
Attendance in lecture sections is strongly recommended but not required.

**Grading:**
- Midterm: 15%
- Final Exam: 15%
- Projects and Assignments: 70%

Your letter grade will be determined from the following chart:

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<thead>
<tr>
<th>Score Range</th>
<th>Letter Grade</th>
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<tbody>
<tr>
<td>94-100</td>
<td>A</td>
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<tr>
<td>90-93</td>
<td>A-</td>
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<tr>
<td>87-89</td>
<td>B+</td>
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<td>60-62</td>
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<td>0-59</td>
<td>F</td>
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**Academic Misconduct:**
All work is to be the original work of the individual or, in the case of lab experiments, the two lab group members. Depending on the severity, individuals performing plagiarism, cheating, and/or any other violation of the Student Code of Conduct may result in a zero for the assignment, may receive a grade of F for the class, or may be referred to the Ohio University Judiciaries.