

Course name	ECE 59500 Introduction to Connected and Automated Vehicles
Credit and contact hours	(3 cr.) Class 3
Course coordinators' name	Lingxi Li and Yaobin Chen
Textbook	<p>Required: Umit Ozguner, Tankut Acarman, and Keith Redmill. <i>Autonomous Ground Vehicles (ITS)</i>, ISBN-10: 1608071928, ISBN-13: 978-1608071920. Publisher: Artech House, 2011.</p> <p>References:</p> <p>1. Edited by Azim Eskandarian. <i>Handbook of Intelligent Vehicles</i>. ISBN-10: 0857290843, ISBN-13: 978-0857290847. Publisher: Springer, 2012.</p> <p>2. Edited by Yaobin Chen and Lingxi Li. <i>Advances in Intelligent Vehicles</i>. ISBN-10: 0123971993, ISBN-13: 978-0123971999. Publisher: Academic Press, 2013.</p>
Course information	<p>Course description: ECE 59500 Introduction to Connected and Automated Vehicles. P or C: Graduate standing or consent of instructor. This course introduces the basic concepts and components of connected and automated vehicles. Basic vehicle dynamics and several advanced driver assistance systems (ADAS) will be introduced. Key technologies associated with automated driving, such as perception, communication, mapping and localization, decision making, and control will be presented and discussed. Hands-on lab experiments on a small-scale vehicle platform will be performed.</p> <p>Prerequisites for undergraduate students: ECE30100: Signals and Systems ECE30200: Probabilistic Methods in ECE Graduate standing or consent of instructor</p> <p>Required, Elective, or Selected Elective: EE Elective, CE Elective</p>
Goals for the course	<p>Upon successful completion of the course, students should be able to</p> <ol style="list-style-type: none"> 1. Understand the basic concepts related to vehicle dynamics of automated driving. [1, 2, 6] 2. Analyze the performance of several ADAS functions. [1, 2, 6] 3. Design basic sensing, perception and decision-making algorithms and control laws for automated vehicles. [1, 2, 5, 6]

	<ol style="list-style-type: none"> 4. Use the small-scale vehicle platform provided to achieve assigned tasks. [1, 2, 5, 6] 5. Test and evaluate the performance of connected and automated vehicles using driving simulator and/or computer-aided tools. [1, 2, 6]
List of topics to be covered	<ol style="list-style-type: none"> 1. Introduction: Connected and automated vehicles (1 class) 2. Review of basic vehicle dynamics (3 classes) 3. Advanced driver assistance systems (5 classes) 4. Key technologies for connected and automated vehicles: sensing and perception, mapping and localization, decision-marking, and control (15 classes) 5. Course project and experiments on the small-scale vehicle platform (4 classes) 6. Exams and project demo (2 classes)
Syllabi approved by	Lingxi Li/Yaobin Chen
Date of approval	November 2, 2019