



ME190: ME Special Topic: Unmanned Aerial Systems (UAS)¹

Summer 2017 || Instructor: YangQuan Chen || First 6 weeks session (I): Monday, May 22 - Friday, June 30, 2017 || **Course load for 6 weeks (total 20 hours total per week, 13.3 contact hours)**

Designation: ME190: Unmanned Aerial Systems

Catalog Description: “Unmanned Aerial Systems” (UAS) prepares students with essential foundational, design, integration and operational knowledge to meet emerging UAS workforce demands. Topics: UAS history, classification, applications, safety compliance; UAS components, basic aerodynamics, flight dynamics, navigation and control, payload integration, mission planning, sense-n-avoid; UAS use cases and other selected emerging topics. (4 credits with labs.)

Prerequisites:

- ENGR 057 and ENGR 065 or Instructor approval. Letter grade only. Laboratory included.

Text Books and Other Required Materials:

- Douglas M. Marshall, Richard K. Barnhart, Stephen B. Hottman, Eric Shappee, Michael Thomas Most. **Introduction to Unmanned Aircraft Systems**. CRC Press. October 25, 2011 by CRC Press; Textbook - 233 Pages - 56 B/W Illustrations; ISBN 9781439835203 - CAT# K11588. Free eBook UC Merced subscription. **Official Textbook.**
- FAA-H-8083-25 - Pilot’s Handbook of Aeronautical Knowledge. Online free copy: http://www.faa.gov/regulations_policies/handbooks_manuals/aviation/pilot_handbook/ **Official Main Reading Material.**

Course Goals:

- To develop an overall understanding of UAS history, UAS types, and civilian small UAS applications;
- To develop a firm understanding of UAS operational safety and rule-compliance requirements.
- To understand basic UAS elements;
- To obtain basic knowledge of UAS aerodynamics and flight dynamics;
- To obtain basic knowledge of UAS guidance, navigation and control;
- To obtain basic knowledge of UAS payloads and the enabled ConOps (concept of operations);
- To obtain basic knowledge of UAS mission planning, GCS operations;
- To obtain basic knowledge of UAS UTM (UAS Traffic Management), BVLOS (beyond visual line-of-sight) requirement and sense-and-avoid techniques;
- To obtain basic knowledge of UAS use cases and drone **entrepreneurial process**.

Learning Outcomes:

- To be able to understand typical civilian low cost UAS systems;
- To be able to operate typical civilian low cost UAS systems;
- To be able to understand and comply FAA regulations on small UAS operations;
- To be able to integrate typical mission sensors in typical civilian low cost UAS systems;
- To be able to get ready for applying for an FAA’s Remote Pilot Certificate with a Small UAS rating
- To be able to get ready to create UAS related engineering practice/service or to join UAS work force.

¹ This course is lab-intensive. Total lecture hours (2400 min.) 400 min. lectures per week (two 200 min. lectures, or four 50 min. lectures per week) and 6.67 hours lab session per week (or, two 3.33 hours labs per week). **Total student committed contact hours per week: 13.33 hours** (800 min.) **Total student self-studying hours per week: 6.67 hours.** (book reading, home works, literature review, report writing etc.) **So this is a 20 hours per week commitment for 6 weeks, to get 4 credits as Technic Elective for ME or other engineering and non-engineering programs.**