

<b>Course name:</b> EE475 Electronic Systems of UAV				<b>Department:</b> Electrical and Electronics Engineering				
<b>Semester</b>	<b>Methods of Education</b>							<b>Credit (ECTS)</b>
	Lecture	Recitation / (Etud)	Lab	Project/Field Study	Homework	Other	Total	
2	XX	28		40	60	15	185	7,5
<b>Language</b>	English							
<b>Compulsory/Elective</b>	Elective							
<b>Prerequisites</b>	None							
<b>Course Contents</b>	<p>This course covers the electronic and avionic systems of unmanned aircraft. The primary objectives of the course are the understanding of autopilot, lithium batteries, battery management systems of UAV, battery eliminating circuits (BEC) of UAV, bldc motors used in UAV, servo actuators of UAV, RF communication between UAV and ground control station, global positioning systems (GPS) of UAV. The emphasis of the course will be thorough understanding working principle and data reading via microcontroller from the sensors used in autopilot such as accelerometer, gyroscope, barometer. In addition key parameters for designing an UAV, relation between payload air vehicle size and endurance will be examined in this course. What are the constraints of the current electronic system of UAV is also included at the end of the course.</p>							
<b>Course Objectives</b>	To provide students a basics aspects of electronic system of unmanned aircrafts in terms of batteries, sensors, servo system, embedded systems, communication and navigation system of UAV.							
<b>Learning Outcomes and Competences</b>	<p>Upon completion of the subject, students will be able to;</p> <ul style="list-style-type: none"> <li>- Having basic understanding avionic systems of UAV</li> <li>- Understand how autopilot, servo, bldc, battery management circuit, gps work and are integrated into the UAV</li> <li>- Able to make own mini simple multirotor or fixed wing UAV</li> </ul>							
<b>Textbook and /or References</b>	<p><b>Main textbooks:</b></p> <p>Introduction to UAV Systems, Paul Fahlstrom and Thomas Gleason, 4th Edition, September 17, 2012 , Wiley.</p> <p><b>Supplementary textbooks:</b></p> <p>Designing Unmanned Aircraft Systems: A Comprehensive Approach, Gundalach, J., 2nd Edition, August 31, 2014, AIAA Press.</p>							
<b>Assessment Criteria</b>					<b>If any, mark as (X)</b>		<b>Percentage (%)</b>	
	Midterm Exams				X		30	
Quizzes								

	Homework	X	20
	Projects		
	Term Paper		
	Laboratory work		
	Other		
	Final Exam	X	50
<b>Instructors</b>	Assoc. Prof. Dr. Sinan KIVRAK		
<b>Week</b>	<b>Subject</b>		
1	Autopilot of UAV Systems		
2	Electric powered UAVs and Its battery systems		
3	Battery Management Systems of UAV		
4	Battery elimating circuits of UAV		
5	Brushless DC motors used in UAV		
6	How to drive a bldc motor		
7	Servo actuators of UAV		
8	Driving a basic servo with microcontroller		
9	<b>Midterm Exam</b>		
10	RF communication of UAV		
11	Global positioning system		
12	Basic Principle and types of Sensors used in the UAVs. How Physical Quantities Are Measured with Sensors		
13	Data reading from gyroscope via microcontroller		
14	Data reading from accelerometer and barometer via microcontroller		
15	Analyzing gathered data from sensors		