Course Name/Code: ILT 534 Thin Film Technologies					ADVANCED TECHNOLOGIES				
Semester	Teaching and Learning Methods							Credit	
	Theory	App.	Lab.	Project	Term paper	Other	Total	Credit	ECTS Credit
1-2	42		80		20	46	188	**3**	**7.5**
Language	Turkish								
Compulsory/ Elective	Elective								
Prerequisites	None								
Course Content	In this graduate course thin film technologies and their various industrial applications will be explained. Following giving basic information about the fundamentals on crystal structures and epitaxy, thin film processing techniques such as CVD, MOCVD, MBE, PLD, Laser-MBE, sputtering, and evaporation will be examined in the class. Students will also be given applied information on the thin film coating devices in the electron microscopic laboratory in Gazi University. Students will be informed about electrospinning and thin film coating by the electrospinning technique, they will also be informed about the thin film covering technology using the electrospinning device in the nanotechnology research Laboratory at Gazi Faculty of Chemistry Education and will be able to practice using the AFM instrument which is available in the same laboratory. There will be another lab application about the spray coating, photoluminescence, ATR-FTIR and UV instruments at the STARLAB of Faculty of Science. They will also visit the national nanotechnology Research Center at Bilkent University and get informed about thin film coating and characterization techniques. Also they will also get informed about the LED, fuel cell and solar cells.								
Course Objectives	Hundreds of new devices (such as the Light Emitting Diodes or the LED, the fuel cell and the solar cells) entered the market due to the development of the thin film science and technology enabling the development of new materials. The material science of thin film technologies is a multi-disciplined area of science including many other areas such as chemistry, solid form physics and mechanics. In this course, thin film technologies and their industrial application areas will be explained.								
Learning outcomes and competences	Thanks to this course, students will also gather information on basic subjects such as crystal structures and their defects, nucleation and growth mechanisms and epitaxy. Also they will gather information on thin film processing techniques such as CVD, MOCVD, MBE, PLD, Laser-MBE, sputtering and vaporization. Besides, the consolidation of the theoretical information gathered by the students will be obtained by visits to laboratories using thing film techniques. Students will learn to use technical and modern devices about thin film science and technology and they will a have a chance to present what they learn orally and written, work on interdisciplinary studies and they will gain the ability to differentiate what is right and what is wrong and analyze of the results quickly.								
Textbook and /or References	1. Electronic Thin Film Science for Electrical Engineers and Materials Scientists, by K-N Tu, J. W. Mayer and L. C. Feldman, 1992. 2. Materials Science of Thin Films: Deposition and Structure, by M. Ohring, 2002. 3. Elements of X-ray Diffraction, 2nd Edition, by B. D. Cullity, 1978. 4. Introduction to Dislocations, by D. Hull and D. J. Bacon, 4th Edition, 2001.								

Assessment Criteria		***If any, mark as (X)***	**Percentage (%)**
	Midterm Exams	X	30
	Quizzes		
	Homeworks		
	Projects		
	Term paper	X	10
	Laboratory Work	X	20
	Other		
	Final Exam	X	40

Prepared by	Prof.Dr. İbrahim USLU
Week	**Subject**
1	Introduction to thin film technologies
2	Applications of thin film technologies.

3	Crystal structures and thin films
4	Thin film structures and defects in thin films (vacancies and interstitials, etc)
5	Nanocrystals, polycrystals and epitaxical growth.
6	The nucleation and growth models of thin films (2D, 3D and 2D-3D),
7	Midterm exam
8	Thin film applications and thin film techniques (LED and Fuel cell, Solar cell)
9	Thin film production techniques (chemical, physical and plasma evaporation). E-beam vaporization, sputtering and solution based flocculation techniques (such as Çöz-Pel)
10	Lab sessions (In SEM at Biology Dept).
11	Visit to the STARLAB and gathering information on spray coating, photoluminescence,
12	ATR-FTIR and UV instruments.
13	Application of electrospinning and the AFM device in the nanotechnology research Laboratory in Gazi Faculty of Education
14	Visit to the National Nanotechnology Research Center (UNAM) in Bilkent University and gathering information on thin films and nanotechnology.