




(Advanced Heat Transfer) Course Catalogue 2023-2024

College	Erbil Technical Engineering College	
Department	Mechanical and Energy Engineering	
Module Name	Advanced Heat Transfer	
Module Code	AHT201	
Degree	Technical Diploma <input type="checkbox"/>	Bachelor <input type="checkbox"/> High Diploma <input checked="" type="checkbox"/> Master PhD
Semester	2	
Qualification	M.Sc.	
Scientific Title	Professor	
ECTS (Credits)	6	
Module type	Prerequisite <input type="checkbox"/>	Core <input checked="" type="checkbox"/> Assist. <input type="checkbox"/>
Weekly hours		
Weekly hours (Theory)	(3)hr Class	(12)Total hrs Workload
Weekly hours (Practical)	()hr Class	()Total hrs Workload
Number of Weeks	15	
Lecturer (Theory)	Prof. Dr. Ahmed Mohammed Adham	
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Websites	https://academicstaff.epu.edu.iq/faculty/ahmed.adham	

Course Book

Course Description	In this course, a unique source of material that covers each mode of multiphase heat transfer, as well as the fundamentals of heat transfer will be provided. Many Topics of special interest will be given to the students such as Transient heat transfer and phase change heat transfer (Boiling and Condensation). The title of this course was modified to Advanced Heat Transfer in order to better reflect the focus on advanced methods of analysis and the broader range of applications, including new topics such as chemically reacting flows with heat transfer.				
Course objectives	The main objectives of this course it to provide better understanding to some topics which was not covered in the undergraduate studies. These topics will help the master student to carry out his upcoming research with some new knowledge.				
Student's obligation	The students are obliged to attend and pass this course as a requirement to start their master thesis. He / She has to submit a review paper (not less than 3000 words) on a selected topic which is preferred to be close to his/her research field and also they should pass the final examination.				
Required Learning Materials					
Evaluation	Task	Weight (Marks)	Due Week	Relevant Learning Outcome	
	Paper Review	0 %			
	Assignments	Homework	0 %		
		Attendance	5 %		
		Report	5 %	12	
		Seminar	10 %	8	
		Essay	0 %		
		Project	0 %		
	Quiz	10 %	5 & 9		
	Lab.	0 %			
	Midterm Exam	20 %	7		
	Final Exam	50 %	15		
	Total	100 %			
Specific learning outcome:	1- To provide better understanding to the Basic mechanisms of Heat Transfer 2- To deal with Transient conduction heat Transfer 3- To be able to work in the phase change heat transfer field 4- To deal with some topics with special interest.				

Course References:	1- C. P. Kothanadraman, Fundamentals of Heat and Mass Transfer. 2- J. P. Holman, Heat transfer. 3- Y. Cengel. Heat Transfer, 6 th Edition, 2009, John Wiley & Sons, Inc. 4- F. Kerith and et al., Principles of heat transfer. 5- H. Schlichting, Theory of boundary layer.	
Course topics (Theory)	Week	Learning Outcome
Basics of Heat Transfer a- Mechanism of heat transfer. b- Conduction heat transfer. c- Convection heat transfer. d- Radiation of heat transfer. e- Simultaneous heat transfer mechanisms. f- Study one dimensional and multi-dimensional conduction.	1-3	
Transient Heat Conduction: a- Lumped system analysis. b- Transient heat conduction in large plane walls, long cylinders and spheres with spatial effects. c- Transient heat conduction in semi-infinite solids. d- Transient heat conduction in multidimensional systems. e- Topic of special interest (Refrigeration and Freezing of Foods).	4-6	
Fundamentals of Convection: a- Physical mechanism of convection. b- Classification of fluid flow. c- Velocity boundary layer. d- Thermal boundary layer. e- Laminar and Turbulent flows.	7-8	
External Forced Convection: a- Drag Force and parallel flow. b- Flow across cylinders and spheres. c- Flow across bank of tubes. d- Topic of special interest (Reducing heat transfer through surfaces).	9-10	

<p>Internal Forced Convection:</p> <p>a- Mean velocity and mean temperature. b- The entrance region. c- General thermal analysis. d- Laminar flow in tubes. e- Turbulent flow in tubes</p>	11-12	
<p>Natural (Free) Convection:</p> <p>a- Natural convection over surfaces. b- Natural Convection inside enclosures. c- Combined forced and natural convection. d- Topic of special interest (Heat transfer through windows).</p>	13	
<p>Boiling and Condensation:</p> <p>a- Boiling heat transfer. b- Pool boiling. c- Flow boiling. d- Condensation heat transfer. e- Film Condensation f- Dropwise condensation..</p>	14	
Final Examination	15	
Questions Example Design		
Extra notes:		
<p>External Evaluator</p> <p>I confirm that the contents of this syllabus (course catalogue) are sufficient and cover all the requirements of Research Methodology subject.</p> <div style="text-align: right; margin-right: 100px;">  </div> <p style="text-align: right;">Assist. Prof. Dr. Banipal N. Yaqob 03/03/2024</p>		