	Ministry of Higher Education and Scientific Research - Iraq Warith Al-Anbiyaa University College of Engineering Department of Aircraft Engineering	

MODULE DESCRIPTOR FORM
نموذج وصف المادة الدراسية

Module Information
معلومات المادة الدراسية

Module Title	Heat Transfer I انتقال حرارة I	**Module Delivery**	
Module Type	CORE	**Theory**	
Module Code	AIEN352		
ECTS Credits	4		
SWL (hr/sem)	100		
Module Level	3	**Semester of Delivery**	5
Administering Department	ME	**College**	ME
Module Leader	Prof Dr. Ghanem Kazem Abdel Saada	**e-mail**	ghanim.sada@uowa.edu.iq
Module Leader's Acad. Title	Dr.	**Module Leader's Qualification**	Ph.D.
Module Tutor	None	**e-mail**	None
Peer Reviewer Name	Dr.	**e-mail**	
Review Committee Approval	01/12/2025	**Version Number**	2025

Relation With Other Modules
العلاقة مع المواد الدراسية الأخرى

Prerequisite module	***	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. To develop problem solving skills and understanding of general heat transfer concepts and definitions. 2. To understand heat transfer modes (conduction, convection and radiation). 3. This course deals with the basic concept of conduction and radiation heat transfer. 4. This is the basic subject for all conduction convection systems like as fins. 5. To understand heat transfer problems in one and two dimensions. 6. To analysis the steady and unsteady heat transfer.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Recognize the types of heat transfer modes. 2. List the various of conduction heat transfer applications in a one-dimension steady state plane wall, Composed wall, Cylinder, and Sphere. 3. Describe the overall heat transfer coefficient. 4. Define the critical thickness of insulation. 5. Summarize what is meant by a basic radiation heat transfer circuit network. 6. Discuss the effect of heat generation during conduction heat transfer modeling. 7. Describe conduction heat transfer in fins. 8. Define Fourier's law, Newton law and Kirchhoff's law in heat transfer. 9. Discuss the two-dimension steady state heat conduction by numerical and energy balance solution 10. Discuss the unsteady state heat conduction by Analytical solution for lumped system, and numerical solution for one and two dimensions. 11. Explain the thermal resistance network in radiation heat transfer analysis. 12. Discuss the Radiation shield effects in radiation heat transfer analysis.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following.

	Introduction: General concepts and definitions, Conduction heat transfer. Convective heat transfer, and Radiation heat transfer. [5 hrs] Conduction heat transfer: General heat conduction equation, one-dimension steady state plane wall, and Composed wall. [5 hrs] Cylinder and composed cylinder, and Sphere and composed sphere. [4 hrs] Overall heat transfer coefficient, Critical thickness of insulation. [4 hrs] One-dimension steady state with heat generation. (Plane wall, Solid cylinder, Hollow cylinder, Sphere). [7 hrs] Conduction heat transfer in fins:General equation for temp distribution, Very long fin, Short fin, End insulated fin, Effectiveness of the fin, and Applications. [11 hrs] Two-dimension steady state heat conduction: Numerical solution (nodes), with Applications and examples. [7 hrs] Unsteady state heat conduction: Analytical solution for lumped system, and Numerical solution for one and two dimensions. [7 hrs] Radiation heat transfer: Introduction to thermal radiation, The electromagnetic waves, The black body, and The shape factor, and Two parallel plates (gray body). [6 hrs] Two concentric cylinders, Radiation between more than two bodies, Thermal resistance network, and Radiation shields. [11 hrs]
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering type of simple experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	33	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	67	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.5
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	100		

Module Evaluation
تقييم المادة الدراسية

		Time/ Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	4	20% (20)	3,5,9,11	All
	Assignments	2	10% (10)	2, 12	All
	Projects / Lab.	-	-	-	
	Report	1	10% (10)	13	All
Summative assessment	**Midterm Exam**	2 hrs.	10% (10)	7	All
	Final Exam	3 hrs.	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction: General concepts and definitions. Conduction heat transfer. Convective heat transfer. Radiation heat transfer.
Week 2	Conduction heat transfer: General heat conduction equation. One dimension steady state plane wall. Composed wall.
Week 3	Cylinder and composed cylinder. Sphere and composed sphere.
Week 4	Overall heat transfer coefficient. Critical thickness of insulation.
Week 5	One-dimension steady state with heat generation. (Plane wall, Solid cylinder, Hollow cylinder, Sphere).

Week 6	Conduction heat transfer in fins: General equation for temp distribution. Very long fin. Short fin.
Week 7	End insulated fin. Effectiveness of the fin. Applications.
Week 8	Two-dimension steady state heat conduction: Numerical solution (nodes).
Week 9	Applications and examples.
Week 10	Unsteady state heat conduction: Analytical solution for lumped system.
Week 11	Numerical solution for one and two dimensions.
Week 12	Radiation heat transfer: Introduction to thermal radiation. The electromagnetic waves. The black body. The shape factor.
Week 13	Two parallel plates (gray body). Two concentric cylinders.
Week 14	Radiation between more than two bodies.
Week 15	Thermal resistance network. Radiation shields.
Week 16	**Final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	
Week 2	
Week 3	
Week 4	
Week 5	
Week 6	
Week 7	

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts		No
Recommended Texts	1. J. P. Holman, "Heat Transfer", McGraw Hill, tenth Edition 2010. 2. Yunus A. Cengel, " Heat Transfer A practical Approach", McGraw Hill, 2nd Edition, 2002.	Yes
Websites	Any Heat transfer website from international universities.	

APPENDIX:

GRADING SCHEME مخطط الدرجات				
Group	**Grade**	التقدير	**Marks (%)**	**Definition**
Success Group (50 - 100)	**A** - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX** – Fail	مقبول بقرار	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required
Note:				

NB Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.