# The Hashemite University
# Faculty of Engineering
# Course Syllabus

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| **Course Title:** | **HEAT TRANSFER** | **Course Number:** | 110402324 |
| **Department:** | Mechanical Engineering | **Designation:** | Compulsory |
| **Prerequisite(s):** | (Applied maths:110406260, Thermodynamics-I: 110402221 , Fluid Mechanics:110402310 ) | | |
| **Instructor:** | Dr. Ahmad ALQANANWAH | **Instructor's Office:** | E3114 |
| **Instructor's e-mail:** | Ahmad.alqan@gmail.com | | |
| **Office Hours:** | See posted office hours | | |
| **Time :** | Sec #(1) 18:45-20:00 S,M,T,W | **Class Room:** | E2017/Online |

**Course description:**
Ch1. Introduction.
Ch2. Introduction to Conduction.
Ch3. One-Dimensional, Steady-State Conduction.
Ch4. Two-Dimensional, Steady-State Conduction.
Ch5. Transient heat conduction.
Ch6. Introduction to Convection.
Ch7. External Flow.
Ch8. Internal Flow.
Ch9. Free Convection.
Ch10. Boiling and Condensation.
Ch11. Heat exchanger analysis.
Ch12. Radiation: Processes and Properties.
Ch13. Radiation exchange between surfaces.

**Textbook(s):** ***Heat and Mass Transfer: Fundamentals & Applications, 5th Edition, by Yunus A. Cengel & Afshin J. Ghajar McGraw-Hill, 2015.***
***** Soft copies of of the 2nd and 5th editions are available on moodle***

**Other required material:** *Fundamentals of Heat and Mass Transfer, F.P. Incropera, D.P. DeWitt, T.L. Bergman, and A.S. Lavine, 7th Edition (John Wiley & Sons*)

**Primary Course Objective:** Students will learn to model, analyze, and design heat transfer components and systems by applying the appropriate rate equations (for conduction, convection, and radiation) with the principle of energy conservation

**Class schedule:** Four class sessions each week; 60 minutes each

**Grading Plan:**

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| **First Exam** | (15 Points) | **Will be announced later** |
| **Second Exam** | (15 Points) | **Will be announced later** |
| **Quizzes & Homework's** | (20 Points) | **4 quizzes will be conducted through moodle platform** |
| **Final Exam** | (50 points) | |

**COURSE OBJECTIVES**

1. Identify and understand the various mechanisms of heat and mass transfer that characterize a given physical system. (e)
2. Formulate models for heat conduction processes. Apply analytical and numerical methods to solve one- and two-dimensional conduction problems. (a)
3. Combine thermodynamics and fluid mechanics principles to analyze heat convection processes. (e)
4. Integrate radiation aspects into real-world global heat transfer problems. (h, i)
5. Use computer technology, methods and languages to write programs to solve complex heat transfer models. (k, g)
6. Analyze and design complex heat transfer applications, such as heat exchangers. (c)
7. The student should be able to apply the engineering design procedure to a problem. (c)
8. The project should help the student develop skills that would apply to lifelong learning. (i)

| ABET a-k | √ | ME Program Outcomes |
|---|---|---|
| a | √ | Graduates must have the ability to apply knowledge of mathematics and science to solve engineering problems. |
| b | | Graduates must have the ability to design and conduct experiments as well as to analyze and interpret data. |
| c | √ | Graduates must have the ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability. |
| d | | Graduates must have the ability to function on multidisciplinary teams |
| e | √ | Graduates must have the ability to identify, formulate, and solve fundamental engineering problems. |
| f | | Graduates must have an understanding of professional and ethical responsibility |
| g | √ | Graduates must have the ability to communicate effectively. |
| h | √ | Graduates must possess the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context. |
| i | √ | Graduates must recognize the need for, and possess an ability to engage in, life-long learning. |
| j | | Graduates must possess knowledge of contemporary issues. |
| k | √ | Graduates must have the ability to use techniques, skills, and modern engineering tools necessary for engineering practice. |

**Prepared by:** Dr. Ahmad ALMiGDADY **Date:** 29/06/ 2020