DEPARTMENT OF MECHANICAL AND INDUSTRIAL ENGINEERING
MECHANICAL ENGINEERING PROGRAM, BSC.

Course Syllabus

1. **Course number and name**
   ME 452 Heat Transfer Laboratory

2. **Credits and contact hours**
   (0+1) 1 credit hour, 3 contact hours

3. **Course type**
   Face to face Learning Course (3+0)

4. **Instructor's or course coordinator's name**
   Eng. Dia' A. Afaneh

5. **Textbook information**
   Heat Transfer Laboratory Manual.

   a. **Other supplemental materials**
      Fundamentals of Heat and Mass Transfer-7th edition-(Theodore L. Bergman, Adrienne S. Lavine, Frank P. Incropera, and David P. Dewitt.
      Instructor's notes

6. **Specific course information**
   a. **Catalog description**
      Performing laboratory experiments such as Work to heat, specific heat ratio, Gas fuel calorific value, Refrigeration cycle, Flash and fire point of a fuel, Marcet boiler, Viscosity measurement, and instant gas heater..

   b. **Prerequisites or co-requisites**
      Co-requisite: ME 455 Heat Transfer.

   c. **The course is:**
      Required in Mechanical Engineering Department.

7. **Specific goals for the course**
   a. **Course outcomes:**
   After completion of the course, students are expected to be able to:

      1. Determine the thermal conductivity of solid materials.
      2. Show the relation between the intensity of radiation on a surface and the distance of the surface from the radiation source.

3. Determine the emissivity of different surfaces and show how it is varies with source temperature.
4. Demonstrate the working principles of a concentric tube heat exchanger operating under parallel flow and counter flow conditions.
5. Determine the heat transfer coefficient for natural and forced convection at plate surface.

b. The following student outcomes are addressed by the course:

SO-(b): Ability to design and conduct experiments, as well as to analyze and interpret data.

SO-(g): an ability to communicate effectively.

SO-(k) use the techniques, skills, and modern engineering tools necessary for engineering practice

SO-(pc-3) prepare students to work professionally in mechanical systems

8. Learning Outcomes and their Alignment with Program Educational Objective (PEO's), Methods of Delivery, and Assessment Methods:

Learning Outcomes	Program PEOs	Method of Delivery	Assessment Method
Course Outcomes			
Determine the thermal conductivity of solid materials.	-	Experiment	Question in exam
Show the relation between the intensity of radiation on a surface and the distance of the surface from the radiation source.	-	Experiment	Question in exam
Determine the emissivity of different surfaces and show how it is varies with source temperature.		Experiment	Question in exam
Demonstrate the working principles of a concentric tube heat exchanger operating under parallel flow and counter flow conditions.	-	Experiment	Question in exam
Determine the heat transfer coefficient for natural and forced convection at plate surface.		Experiment	Question in exam
Student Outcomes			
SO-(b): Ability to design and conduct experiments, as well as to analyze and interpret data.			

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SO-(g): an ability to communicate effectively.			
SO-(k) use the techniques, skills, and modern engineering tools necessary for engineering practice			
SO-(pc-3) prepare students to work professionally in mechanical systems			

9. Weekly Teaching Plan

Week No.	Lecture	Topic	Method of Delivery
1	Mon (13:00–16:00)	Introduction	Experiment
2	Mon (13:00–16:00)	THERMAL CONDUCTIVITY OF BUILDING & INSULATING MATERIAL	Experiment
3	Mon (13:00–16:00)	CONCENTRIC TUBE HEAT EXCHANGER	Experiment
4	Mon (13:00–16:00)	FREE CONVECTION HEAT TRANSFER	Experiment
5	Mon (13:00–16:00)	FORCED CONVECTION HEAT TRANSFER FOR FLAT PLATE TEST	Experiment
6	Mon (13:00–16:00)	FORCED CONVECTION HEAT TRANSFER FOR PINNED- FINNED PLATE TEST	Experiment
7	Mon (13:00–16:00)	INVERSE SQUARE LAW FOR HEAT AND LIGHT	Experiment
8	Mon (13:00–16:00)	Midterm Exam	Exam
9	Mon (13:00–16:00)	STEFAN BOLTZMANN LAW	Experiment
10	Mon (13:00–16:00)	EMISSIVITY	Experiment
11	Mon (13:00–16:00)	BOILING AND CONDENSATION HEAT TRANSFER	Experiment
12	Mon (13:00–16:00)	UNSTEADY STATE HEAT TRANSFER	Experiment
13	Mon (13:00–16:00)	HEAT CONDUCTION IN FLUIDS.	Experiment
14	Mon (13:00–16:00)	Design experiment	Experiment
15	Mon (13:00–16:00)	Final Exam	Exam

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10. Grade Distribution:

Assessment	Grade	Date
- Midterm Exam	30%	8th Week
- Assignments	30%	
- Final Examination	40%	15th Week

* Make-up exams will be offered for valid reasons. It may be different from regular exams