<table>
<tr><td>Course Title</td><td colspan="5">Heat Transfer</td></tr>
<tr><td>Course Code</td><td colspan="5">MME 217</td></tr>
<tr><td>Course Type</td><td colspan="5">Compulsory</td></tr>
<tr><td>Level</td><td colspan="5">Undergraduate</td></tr>
<tr><td>Year / Semester</td><td colspan="5">2^{nd} Year / 4^{th} Semester</td></tr>
<tr><td>Teacher’s Name</td><td colspan="5">Dimokratis G.E. Grigoriadis</td></tr>
<tr><td>ECTS</td><td>6</td><td>Lectures / week</td><td>3+1 hours</td><td>Laboratories / week</td><td>1.5 hours</td></tr>
<tr><td>Course Purpose and Objectives</td><td colspan="5">Introduction to heat transfer phenomena so that students familiarize with the basic principles of thermal energy transfer and governing equations. Understanding the physical mechanisms of Heat Transfer in a variety of applications and Recognition of heat transfer phenomena in practical problems, including analysis design and solution methods.</td></tr>
<tr><td>Learning Outcomes</td><td colspan="5">• Analyze, measure and report thermal properties such as linear and expansion coefficient, thermal conductivity and capacity.
• Identify and estimate the relative importance of different modes of heat transfer for engineering problems.
• Draw equivalent thermal circuits and estimate heat transfer rates
• Apply the laws of heat transfer to analyze and evaluate heat transfer rates with conduction and convection.
• Solve practical problems involving heat transfer problems including conduction, convection and radiation.
• Review the importance of dimensionless groups in heat transfer and calculate heat transfer rates using empirical correlations.</td></tr>
<tr><td>Prerequisites</td><td colspan="2">MAS 025</td><td>Required</td><td colspan="2">None</td></tr>
<tr><td>Course Content</td><td colspan="5">Linear and volumetric expansion. Mechanisms of Heat Transfer (HT), Fourier, Newton and thermal radiation laws of HT. Conductivity and diffusion coefficients, emissivity. Electrical analog of HT, electrical resistance and equivalent thermal circuits. General differential equation of heat conservation. Steady conduction in one dimension with or without internal heat sources, analytical solutions of flat walls, cylinders and spheres. Steady conduction in two dimensions, shape factors, numerical solutions. HT from fins and extended surfaces. Transient HT, Heisler charts. Lumped capacitance method, Biot and Fourier numbers. Forced and natural convection, Reynolds, Prandtl, Nusselt, Rayleigh and Grashof dimensionless numbers. Mixed convection, boiling and condensation. Heat exchangers.

Laboratory Exercises
• Measurement of thermal conductivity
• Measurement of coefficient of emissivity
• Effect of distance on thermal radiation
• Laboratory assignment in Matlab
• Laboratory assignment in SolidWorks</td></tr>
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Teaching Methodology	• Lectures • Tutorial sessions • Laboratory exercises (groups of four students) • Demonstrations • Communicative, Collaborative • During the first week of the semester the students receive the course syllabus, which includes the course content, bibliography, learning outcomes, assessment and office hours.
Bibliography	• Course notes • Incropera, F.P. and D.P. DeWitt, *Fundamentals of Heat and Mass Transfer*, 5th edition. Willey. • Cengel, Y.A., *Heat Transfer: A Practical Approach*, 2nd ed. McGraw-Hill, ISBN: 9780072458930.
Assessment	• Laboratory reports 10% • Computational assignment 5% • Midterm exam 30% • Final exam 55%
Language	Greek