

أسم الجامعة: جامعة ديالى  
 أسم الكلية: الهندسة  
 أسم القسم: الميكانيك  
 أسم المحاضر: د. جاسم محمد عبد اللطيف  
 اللقب العلمي: مدرس  
 المؤهل العلمي: دكتوراه هندسة ميكانيكية  
 مكان العمل: قسم الهندسة الميكانيكية



جمهورية العراق  
 وزارة التعليم العالي و البحث العلمي  
 جهاز الإشراف التقويم العلمي

(( أستمارة الخطة التدريسية السنوية ))

|  |               |              |           |             |               |                           |
|--|---------------|--------------|-----------|-------------|---------------|---------------------------|
| د. جاسم محمد عبد اللطيف  |               |              |           |             |               | اسم التدريسي:             |
| jmabdulateef@yahoo.com   |               |              |           |             |               | البريد الالكتروني:        |
| Heat Transfer  |               |              |           |             |               | اسم المادة:               |
| 3 hrs per week , theory: 2 hrs , tutorial : 1 hrs  |               |              |           |             |               | مقرر الفصل:               |
| This module aims to:<br>1. Familiarize the students with the three basic forms of heat transfer<br>2. Introduce the students to the basic concepts of steady state and transient heat conduction, convection heat transfer, and radiation heat transfer  |               |              |           |             |               | اهداف المادة:             |
| Upon the completion of this module, the student will be able to:<br>1. Understand principles of conductive, convective, and radiative heat transfer<br>2. Apply the above heat transfer principles to solve practical engineering problems<br>3. Integrate knowledge on mass, momentum, heat transfer, and thermodynamics<br>4. Apply the above integrated knowledge to solve practical engineering problems<br>5. Apply the basics of heat transfer to engineering design |               |              |           |             |               | التفاصيل الاساسيه للمادة: |
| Heat Transfer, by J. P. Holman, 10 <sup>th</sup> Edition, McGraw-Hill, 2010  |               |              |           |             |               | الكتب المنهجية:           |
| Heat Transfer: A Practical Approach, by Yunus A. Cengel. 2 <sup>nd</sup> Edition, McGraw-Hill, 2002  |               |              |           |             |               | المصادر الخارجية:         |
| الامتحان النهائي   | السعي النهائي | الفصل الثاني | نصف السنة | الفصل الاول | الفصل الدراسي | تقديرات الفصل:            |
| 60%  | 40%           | 10%          | 20%       | 10%         | الدرجة        |                           |
| A couple of quizzes have to be done during the both semesters<br>Assignmts and reports are required during both smesters   |               |              |           |             |               | معلومات اضافية:           |

## Course weekly Outline-Semester(1)

| الملاحظات | المادة النظرية | محتوى المادة  | التاريخ    | الأسبوع |
|-----------|----------------|---|------------|---------|
|           |                | <b>Introduction</b><br>- General concepts and definitions<br>- Heat conduction<br>- Convective heat transfer<br>- Thermal radiation   | 2014/9/23  | ١       |
|           |                | <b>Conduction heat transfer (general equation)</b><br>- General heat conduction equation<br>- One-dimensional, steady state, conduction through plane wall  | 2014/9/30  | ٢       |
|           |                | <b>Conduction heat transfer (1-D, steady state)</b><br>- Composed wall<br>- Cylinder, composed cylinder<br>- Sphere, composed sphere  | 2014/10/7  | ٣       |
|           |                | <b>Conduction heat transfer (1-D, steady state, with heat generation) in</b><br>- Plane wall<br>- Composed wall<br>- Solid cylinder   | 2014/10/14 | ٤       |
|           |                | - Hollow cylinder<br>- Sphere<br>- Critical thickness of insulation   | 2014/10/21 | ٥       |
|           |                | <b>Heat transfer through extended surfaces (fins)</b><br>- General equation for temperature distribution<br>- Very long fin<br>- Short fin  | 2014/10/28 | ٦       |
|           |                | - End insulated fin<br>- Effectiveness of the fin<br>- Applications for previous subjects   | 2014/11/4  | ٧       |
|           |                | <b>2-D, Steady state heat conduction</b><br>- Analytical solution with different boundary conditions<br>- Exact Solution with different boundary conditions<br>- Numerical solution for two-D steady state heat conduction equation (nodes) | 2014/11/11 | ٨       |
|           |                | <b>2-D Unsteady state heat conduction</b><br>- Analytical solution for the unsteady state heat conduction equation. (lumped system)<br>- Numerical solution   | 2014/11/18 | ٩       |

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|                        |  |  |            |    |
|------------------------|--|--|------------|----|
|                        |  | <b>Convective heat transfer</b><br>- Fluid flow background<br>- Laminar and turbulent flow<br>- Boundary layer growth for external flow and internal flow  | 2014/11/25 | ١٠ |
|                        |  | <b>Forced convection</b><br>- Energy equation<br>- Thermal boundary layer and temperature distribution and heat transfer for:<br>Laminar flow over flat plate<br>Laminar flow through closed channels<br>- Empirical equation for cross flow for cylinder, sphere and tube bank<br>- Empirical equation for turbulent flow | 2014/12/2  | ١١ |
|                        |  | <b>2-D, Steady state heat conduction</b><br>- Analytical solution with different boundary conditions<br>- Exact Solution with different boundary conditions<br>- Numerical solution for two-D steady state heat conduction equation (nodes)  | 2014/12/9  | ١٢ |
|                        |  | <b>2-D Unsteady state heat conduction</b><br>- Analytical solution for the unsteady state heat conduction equation. (lumped system)<br>- Numerical solution  | 2014/12/16 | ١٣ |
|                        |  | <b>Convective heat transfer</b><br>- Fluid flow background<br>- Laminar and turbulent flow<br>- Boundary layer growth for external flow and internal flow  | 2014/12/23 | ١٤ |
|                        |  | <b>Forced convection</b><br>- Energy equation<br>- Thermal boundary layer and temperature distribution and heat transfer for:<br>Laminar flow over flat plate<br>Laminar flow through closed channels<br>- Empirical equation for cross flow for cylinder, sphere and tube bank<br>- Empirical equation for turbulent flow | 2015/1/30  | ١٥ |
| <b>Half-Year Break</b> |  |  |            |    |

## Course weekly Outline-Semester(2)

| الملاحظات | المادة النظرية | محتوى المادة  | التاريخ   | الأسبوع |
|-----------|----------------|---|-----------|---------|
|           |                | <b>Calculation of dimensionless numbers</b><br>- Analytical solution  | 2015/2/17 | 1       |
|           |                | <b>Natural convection</b><br>- General concepts<br>- Grashof number<br>- Free convection for:<br>Vertical plate and tube<br>Horizontal plate and tube | 2015/2/24 | 2       |
|           |                | <b>Thermal radiation</b><br>- Introduction to thermal radiation<br>- The electromagnetic waves<br>- The black body<br>- The shape factor              | 2015/3/3  | 3       |
|           |                | - Thermal radiation between:<br>Two parallel plates (gray)<br>Two concentric cylinder   | 2015/3/10 | 4       |
|           |                | - Thermal radiation between more than two bodies  | 2015/3/17 | 5       |
|           |                | - Thermal resistance network<br>- Radiation shields   | 2015/3/24 | 6       |
|           |                | <b>Heat exchanger</b><br>- General concepts<br>- Types of heat exchangers   | 2015/3/31 | 7       |
|           |                | - Heat exchangers performance by LMTD method  | 2015/4/7  | 8       |
|           |                | - Heat exchanger's effectiveness.<br>- NTU method   | 2015/4/14 | 9       |
|           |                | <b>Condensation and vaporization heat transfer on (vertical tube, horizontal tube, tube bank)</b><br>- Concepts of condensation                       | 2015/4/21 | 10      |
|           |                | - Heat transfer due to condensation<br>- Empirical equation for condensation  | 2015/4/28 | 11      |
|           |                | <b>Boiling heat transfer</b><br>- H.T. due to boiling curve<br>- Empirical equations for boiling  | 2015/5/5  | 12      |
|           |                | <b>Boiling heat transfer calculation (empirical equations)</b><br>- Calculation of heat transfer Coefficient  | 2015/5/12 | 13      |
|           |                | <b>Mass transfer</b><br>- General concepts<br>- Mass transfer modes   | 2015/5/19 | 14      |
|           |                | <b>Reviewing</b>  | 2015/5/26 | 15      |