MEng2084: ENGINEERING THERMODYNAMICS

<table>
<tr><td colspan="5">Department of Textile Engineering
Wollo University</td></tr>
<tr><td>Course Number</td><td colspan="4">MEng2084</td></tr>
<tr><td>Course Title</td><td colspan="4">Engineering Thermodynamics</td></tr>
<tr><td>Degree Program</td><td colspan="4">B. Sc. in Textile Engineering</td></tr>
<tr><td>Module</td><td colspan="4">8: Basics of Mechanical Engineering</td></tr>
<tr><td>Module Coordinator</td><td colspan="4">N.N.</td></tr>
<tr><td>Lecturer</td><td colspan="4">N.N.</td></tr>
<tr><td>ECTS Credits</td><td colspan="4">5</td></tr>
<tr><td rowspan="2">Contact Hours (per week)</td><td>Lecture</td><td>Tutorial</td><td>Laboratory or Practice</td><td>Home study</td></tr>
<tr><td>2</td><td>3</td><td>0</td><td>4</td></tr>
<tr><td>Course Objectives & Competences to be Acquired</td><td colspan="4">The course enables students to
▪ Understand the basic thermodynamic principles
▪ Develop the skills to perform the analysis and design of thermodynamic systems
▪ Develop the skills to accurately articulate thermodynamic issues using proper thermodynamic concepts and technical language</td></tr>
<tr><td>Course Description/ Course Contents</td><td colspan="4">Introductory Concepts and Definitions:
1. Introduction; Thermodynamic systems; property, state, process and equilibrium; Phase; Dimensions and units; Some basic properties of thermodynamics
Pure Substances:
2. Properties of pure substances; Equilibrium mixture of vapor-liquid-phase; Phase diagrams; Independent properties of pure substances; Thermodynamic property tables; Equation of state</td></tr>
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	Work and Heat: 3. Work; Units of work; Expansion and compression work; Other forms of work; Heat; Units of heat *The First Law of Thermodynamics and Energy:* 4. The first law and the system; The first law and the control volume *The Second Law of Thermodynamics:* 5. Basic concepts; Heat engines and refrigerators; Statements of the second law of thermodynamics; Reversible and irreversible processes; The Carnot cycle; The thermodynamic temperature scale *Consequences of The Second Law of Thermodynamics and Entropy:* 6. Entropy and the Claudius inequality; Definition of entropy; Definition of the second law of thermodynamics; Heat transfer as the area under the T-s curve; Isothermal, Reversible process; Isentropic process; Isentropic efficiency Availability and Irreversibility: 7. Introduction; System under going a steady state process; Control volume under going a steady state process; Control volume under going unsteady state process; Availability; Second law efficiency Thermodynamic Cycles: 8. Vapor power cycles; Refrigeration and/or heat pump cycles; Air standard power cycles
Pre-requisites	None
Semester	2nd Semester(2 Year)
Status of Course	Compulsory
Teaching & Learning Methods	Lecture supported by tutorial and assignment.
Assessment/ Evaluation &Grading System	The Lecture and Tutorial parts of the course will each be evaluated separately for 100 % and the final marks will be arrived at by giving weights according to the hours allocated to the Lecture and Tutorial parts. The details are given below :

	<u>Lecture Part (Weight 40%)Tutorial Part (Weight 60%)</u> Mid-Term Examination: **40 %** Assignment (Minimum 3): **30 %** Final Examination: **60%** Quiz (Minimum 3): **30 %** **Total 100%** Project/Seminar: **40 %** **Total 100%**
Attendance Requirements	A minimum of 85 %attendance during lecture and tutorial sessions
Literature	1. R.E. Sonntag, "Fundamentals of Thermodynamics", McGraw-Hill, 1999. 2. Michael J. Moran, H.N. Shapiro, "Fundamentals of Engineering Thermodynamics", John Wiley and Sons. Inc., 1995. 3. Cengel Y A., Bole M A., Thermodynamics – An Engineering Approach, McGraw-Hill. 4. T.D. Eastop and A.McConkey: Applied Thermodynamics 5. K. Wark, Jr, Advanced Thermodynamics for Engineers, McGraw-Hill.