

<b>Course Unit Title</b>	<b>ASOG 300 Mass and Energy Balance</b>
<b>Programme of study</b>	BSc in Mechanical Engineering
<b>Lecturer</b>	Dr.-Ing. Paris A. Fokaides
<b>Type of course unit</b>	Compulsory (for Oil and Gas Engineering Stream)
<b>ECTS</b>	5
<b>Year of study:</b>	3
<b>Semester(s) offered</b>	Fall Semester 2015, 2017
<b>Course content</b>	<ul style="list-style-type: none"> <li>▪ Thermophysical properties of pure substances and mixtures</li> <li>▪ Mass balances for non-reacting and reacting flows</li> <li>▪ Energy balances in non-reacting systems</li> <li>▪ Computational Applications</li> </ul>
<b>Course modules:</b>	<p><u>Module 1: Thermophysical and related properties of materials</u></p> <ul style="list-style-type: none"> <li>▪ Density, composition and concentration</li> <li>▪ The Gibbs phase rule</li> <li>▪ Vapour-liquid equilibrium</li> <li>▪ Properties of solutions</li> </ul> <p><u>Module 2: Fundamentals of material balances in non-reacting systems</u></p> <ul style="list-style-type: none"> <li>▪ The general balance equation</li> <li>▪ Material balances on non-reacting systems</li> <li>▪ Degree-of-freedom analysis</li> <li>▪ Continuous-mixing devices</li> </ul> <p><u>Module 3: Reactive Material Balances</u></p> <ul style="list-style-type: none"> <li>▪ Writing and balancing chemical equations</li> <li>▪ Progress of a reaction</li> <li>▪ The general material balance procedure for a reactive system</li> <li>▪ Combustion material balances</li> </ul> <p><u>Module 4: Energy Balances in non-reacting systems</u></p> <ul style="list-style-type: none"> <li>▪ First law of thermodynamics for open systems</li> <li>▪ Thermodynamic databases for pure substances</li> <li>▪ Combined material and heat balances</li> <li>▪ Multiple-device system balances</li> </ul> <p><u>Module 5: Mass and Energy Balance Laboratory Exercises</u></p> <ul style="list-style-type: none"> <li>▪ Laboratory Exercise 1: Sankey Diagrams using e-Sankey software – Energy mix analysis</li> <li>▪ Laboratory Exercise 2: Sankey Diagrams using e-Sankey software – Non-reacting system mass balance</li> <li>▪ Laboratory Exercise 3: Aspen Plus – Real gas properties</li> <li>▪ Laboratory Exercise 4: Aspen Plus – Mixers and splitters</li> </ul>
<b>Textbooks:</b>	Morris, A. E., Fine, H. A., & Geiger, G. (2011). Handbook on Material and Energy Balance Calculations in Material Processing, Includes CD-ROM. John Wiley & Sons.
<b>Instruction language</b>	English
<b>External reference</b>	<a href="#">link</a>