



## RTU Course "Life Cycle Analysis"

11509 Vides aizsardzības un siltuma sistēmu katedra

### General data

Code	EAS504
Course title	Life Cycle Analysis
Course status in the programme	Compulsory/Courses of Limited Choice
Course level	Post-graduate Studies
Course type	Academic
Field of study	Environmental Engineering and Management
Responsible instructor	Gatis Bažbauers
Academic staff	Jana Simanovska Jūlija Gušča Francesco Romagnoli
Volume of the course: parts and credits points	1 part, 2.0 Credit Points, 3.0 ECTS credits
Language of instruction	LV, EN, RU
Possibility of distance learning	Not planned
Maximum auditorium capacity	50
Maximum number of students per semester	50
Abstract	<p>Life cycle analysis (LCA) is a method for accounting and assessing environmental impacts of the products or technical systems throughout the whole lifecycle. LCA methodology is used to assess any impact on the environment and human health related to the product or manufacturing system. Life cycle analysis is being used increasingly as a decision support tool for policy making and therefore knowledge about this tool is necessary for students studying environmental science and management.</p> <p>The course covers the key issues of LCA:</p> <ol style="list-style-type: none"> <li>1. Definition of goal and scope.</li> <li>2. Inventory analysis.</li> <li>3. Life cycle impact assessment.</li> <li>4. Interpretation of the results.</li> </ol> <p>The course includes such important topics as the definition of functional unit, identification of system boundaries, extension and expansion of the system, allocation; important data, existing data bases; impact assessment, sensitivity analysis and computer modeling system using LCA software, modeling of results and interpretation.</p>
Goals and objectives of the course in terms of competences and skills	<p>Competence</p> <p>The overall aim of the course is to develop in students a systemic approach in analysis of environmental problems, to provide understanding of the theoretical aspects, and to gain experience in life-cycle analysis of products and processes</p> <p>Skills</p> <ul style="list-style-type: none"> <li>• To obtain an overview on various alternative environmental impact assessment tools, to be able to choose among them the most appropriate in order to tackle the problems identified.</li> </ul>
Structure and tasks of independent studies	During the course student shall study a published LCA and write a critical review
Recommended literature	<p>Literatūra (01-mācību literatūra)</p> <ol style="list-style-type: none"> <li>1.Henrikke Baumann, Anne Marie Tillman: The Hitch Hiker's Guide to LCA. - Studentliteratur AB, Lund, Sweden, 2004,-P. 543</li> <li>2.LVS ISO 14050:2004 - Vides pārvaldība - Vārdnīca</li> <li>3.LVS EN ISO 14040:2006 - Vides pārvaldība. Dzīves cikla novērtēšana. Principi un vērtējamā struktūra</li> <li>4.LVS EN ISO 14044:2006 - Vides pārvaldība. Dzīves cikla novērtēšana. Prasības un vadlīnijas</li> <li>5.Jeroen B. (Ed.) Handbook on Life Cycle Assessment. Operational Guide to the ISO Standard.- Dordrecht, Kluwer Academic Publishers, 2002. -P.692</li> </ol> <p>Literatūra (02-papildliteratūra)</p> <ol style="list-style-type: none"> <li>1.European Platform on Life Cycle Assessment, <a href="http://lct.jrc.ec.europa.eu/eplca">http://lct.jrc.ec.europa.eu/eplca</a></li> <li>2.Consultation on guidance documents of the International Reference Life Cycle Data System (ILCD) Handbook, <a href="http://lct.jrc.ec.europa.eu/eplca/deliverables/consultation-on-international-reference-life-cycle-data-system-ilcd-handbook">http://lct.jrc.ec.europa.eu/eplca/deliverables/consultation-on-international-reference-life-cycle-data-system-ilcd-handbook</a></li> <li>3.European Commission's information hub on life cycle thinking based data, tools and services, <a href="http://lca.jrc.ec.europa.eu/lcainfohub/introduction.vm">http://lca.jrc.ec.europa.eu/lcainfohub/introduction.vm</a></li> </ol> <p>Literatūra (03-ieteicamā periodika)</p> <ol style="list-style-type: none"> <li>1.<a href="http://www.sciencedirect.com/">http://www.sciencedirect.com/</a></li> <li>2.<a href="http://www.vidm.gov.lv">www.vidm.gov.lv</a></li> </ol>
Course prerequisites	Ecology and environmental protection

### Course outline

Theme	Hours
Introduction of life cycle analysis (LCA), other methods for environmental impact assessment.	2
Life cycle analysis and a functional unit.	2
ISO standards, Goal, Scope, Borders.	4
Inventory analysis, allocation (according to ISO).	2

Data quality, documentation.	2
Environmental Impact Assessment :characterisation,characterization of toxicological effects,eco-indicators.	5
Normalisation and weighting.	2
Interpretation, sensitivity, uncertainty.	2
Critical preview of LCA.	5
LCA software.	4
Application of LCA in real life.	2

### ***Learning outcomes and assessment***

Learning outcomes	Assessment methods
Student has an overview on various alternative environmental impact assessment tools and is able to choose among them the most appropriate in order to tackle the problem identified.	Type of evaluation: Practical work (discussion), test. Criteria: Student chooses an appropriate environmental impact assessment instruments. depending on the problem
Student is able to identify the main environmental factors of the products and energy systems.	Type of evaluation: Practical work, test. Criteria: Student by introduction to the studied system is able to predict the key impacts to the environment.
Student can explain the main goals and principles of LCA.	Type of evaluation: Practical exercises, course work, test. Criteria: Student can define goals and steps to explore the studied system
Student is able to describe the content of analytical steps and purpose of LCA.	Type of evaluation: Practical work, course work, test. Criteria: Student by performing a critical review is able to judge upon the compliance with the ISO standard, and correspondence of conclusions.
Student is trained in the methodology to carry out LCA. With use of the simplified LCA can propose improvement measures aimed at reduction of the environmental impact of the product or process.	Type of evaluation: Practical work, course work, test. Evaluation criteria: Student has demonstrated the ability to carry out some steps of LCA using calculation methods.
Student can write LCA report in accordance with the guidelines and terminology laid down in ISO standards.	Type of evaluation: Practical work, course work, test. Evaluation criteria: the student has written a report to the pilot LCA.
Student can use LCA software.	Type of evaluation: Practical work, course work, test. Evaluation criteria: The student, working with LCA software, has completed the task and obtained the expected results.
Student can analyze the findings of LCA reports and carry out the critical review of LCA reports.	Type of evaluation: Practical work, course work, test. Evaluation criteria: The student can write a critical review of a study.
Student can introduce the conclusions and potential consequences of results of LCA study.	Type of evaluation: Practical work, test. Criteria: after examination of DCA study, student understands and can explain the main conclusions.

### ***Study subject structure***

Part	CP	ECTS	Hours per Week			Tests		
			Lectures	Practical	Lab.	Test	Exam	Work
1.	2.0	3.0	1.0	1.0	0.0	*		