

# EPX5310 Construction Investments and Project Management

## Extended syllabus

Spring 2024

<b>Course objectives:</b>	<ol style="list-style-type: none"><li>1. To explain and demonstrate the theoretical basis, calculations and techniques used for the cost benefit analysis of major construction investments on the basis of a relevant case study.</li><li>2. To introduce the principles, performance domains, common models, methods and artifacts of project management and relate them to construction projects.</li></ol>
<b>Learning outcomes:</b>	<p>Having completed the course, the student: (Construction Investments part)</p> <ol style="list-style-type: none"><li>1. interprets and applies rules and conventions to develop cash flows for typical, construction-related investments.</li><li>2. applies common investment appraisal metrics (NPV, IRR, etc.) to cash flows to make rational investment decisions.</li><li>3. evaluates cost benefit analysis reports for correctness and consistency.</li></ol> <p>(Risk part)</p> <ol style="list-style-type: none"><li>4. analyzes risk (quantitatively and qualitatively) in the specific contexts of construction investments and project risk management.</li></ol> <p>(Project Management part)</p> <ol style="list-style-type: none"><li>5. adapts (tailors) project management principles, performance domains, common models, methods and artifacts to specific construction projects and project scenarios.</li><li>6. critically appraises existing construction projects to identify project management shortcomings and recommend improvements.</li></ol>
<b>Brief description of the course (topics):</b>	<p>Topics:</p> <ol style="list-style-type: none"><li>1. Course introduction</li><li>2. Introduction to construction investments</li><li>3. Investment appraisal metrics</li><li>4. Cash flows</li><li>5. Cost benefit analysis</li><li>6. Project finance</li><li>7. Concept of risk</li><li>8. Risk in the investment context</li><li>9. Risk in the project management context</li><li>10. Introduction to project management</li><li>11. Project performance domains</li><li>12. Tailoring</li><li>13. Models, methods and artifacts</li></ol>
<b>Language of the course:</b>	English
<b>ECTS credits:</b>	9
<b>Participants:</b>	This course is compulsory for students on the EAE102/23 Structural Engineering and Construction Management integrated studies programme and the EAXM15/23 Building and Infrastructure Engineering master's degree programme. It is optional for other students. Visiting students (e.g. Erasmus students) are welcome to participate in this course.

<b>Special needs:</b>	Students with special needs are welcome to participate in the course. Please inform the lecturer at the beginning of the course of any special needs requirements that affect your participation in any course activities.
<b>Registration:</b>	Students must declare the course in their study plans in the Study Information System. They must also self-enroll in the Moodle course.
<b>Prerequisites:</b>	For students of the EAE102/23 Structural Engineering and Construction Management integrated studies programme and the EAXM15/23 Building and Infrastructure Engineering master's degree programme, there is a prerequisite course: EPX5010 Construction Economics and Introduction to Entrepreneurship. (Students of the EAE102/23 and EAXM15/23 programmes who wish to take this course but have not yet completed the prerequisite course should contact their programme director).
<b>Prior knowledge:</b>	No specific requirements. Masters' degree students from any discipline will have the requisite prior knowledge for this course.
<b>Lecturer:</b>	Emlyn Witt
<b>Getting in touch with the lecturer:</b>	Preferred forms of communication are: in class, by e-mail: <a href="mailto:emlyn.witt@taltech.ee">emlyn.witt@taltech.ee</a> , visiting U03B-305 during designated weekly consultation times.
<b>Contact study schedule:</b>	Two classes of 2 academic hours (one day) and 2,5 academic hours (another day) every week for 16 weeks. (See Detailed Schedule and Topics table below.)
<b>Course e-support:</b>	Materials related to the course are available on the e-learning environment Moodle under the subject name Construction Investments and Project Management <a href="https://moodle.taltech.ee/course/view.php?id=33137">https://moodle.taltech.ee/course/view.php?id=33137</a> Students can enrol themselves using the self-enrolment key: <b>EPX5310_2024</b>
<b>Reference literature and documents:</b>	<p><b>Cash flow calculations</b> (In English) Keown, AJ; Scott, DF; Martin, JD and Petty, JW (1996) Basic Financial Management (7th Edition), Prentice Hall, New Jersey</p> <p>(In Estonian) Külim (1999) Investeeringuarvutus, Külim, Tallinn (This is a direct translation of some chapters from Keown, AJ; Scott, DF; Martin, JD and Petty, JW (1996) Basic Financial Management into Estonian)</p> <p><b>Cost Benefit Analysis Guidelines and Reports</b> European Commission (2014) Guide to Cost-Benefit Analysis of Investment Projects - Economic appraisal tool for Cohesion Policy 2014-2020, Directorate-General for Regional and Urban policy, available at: <a href="https://wayback.archive-it.org/12090/20221203224508/https://ec.europa.eu/inea/sites/default/files/cba_guide_cohesion_policy.pdf">https://wayback.archive-it.org/12090/20221203224508/https://ec.europa.eu/inea/sites/default/files/cba_guide_cohesion_policy.pdf</a></p> <p>FinEst Project (2018) FinEst Link Feasibility Study – Final report, available at: <a href="https://uudenmaanliitto.fi/wp-content/uploads/2021/10/FinEst-link-REPORT.pdf">https://uudenmaanliitto.fi/wp-content/uploads/2021/10/FinEst-link-REPORT.pdf</a></p> <p>FinEst Bay Area Development (2018) FinEst Bay Area Development promotional presentation, available at: <a href="https://www.finestbayarea.online/post/finestbay-area-update-december-3-2018">https://www.finestbayarea.online/post/finestbay-area-update-december-3-2018</a></p> <p><b>Project Management</b> PMI Standards Committee (2021) Guide to the Project Management Body of Knowledge (PMBOK Guide 7th Edition)</p>
<b>EVALUATION</b>	Coursework + Exam

<b>Compulsory activities to complete the course</b>	<b>Evaluation criteria</b>
Assignment 1 – Investment Game (Individual)	Participation (pass/fail)
Seminar 1 – Statistical Data Checking for Cost Benefit Analysis Case Study (Group work) Reflection on learning (Individual)	Participation + individual reflection (pass/fail)
Quiz 1 – Automatically checked practice exercises in Moodle (metrics)	Prerequisite for taking the Construction Investments Exam (Automated feedback)
Seminar 2 – Integrated cash flow development (Group work) Reflection on learning (Individual)	Participation + individual reflection (pass/fail)
Seminar 3 – Checking Financial Cash Flow Calculations for Cost Benefit Analysis Case Study (Group work) Reflection on learning (Individual)	Participation + individual reflection (pass/fail)
Seminar 4 – Checking Economic Cash Flow Calculations for Cost Benefit Analysis Case Study (Group work) Reflection on learning (Individual)	Participation + individual reflection (pass/fail)
Quiz 2 - Automatically checked practice exercises in Moodle (cash flow development, risk calculations, etc.)	Prerequisite for taking the Construction Investments Exam (Automated feedback)
Seminar 5 – Qualitative risk analysis (Group work) Reflection on learning (Individual)	Participation + individual reflection (pass/fail)
Seminar 6 – Quantitative risk analysis (Group work) Reflection on learning (Individual)	Participation + individual reflection (pass/fail)
Seminar 7 – Documentation for risk management (Group work) Reflection on risk (Individual)	Participation + individual reflection (pass/fail)
Seminar 8 – Logical framework (Group work) Reflection on logical framework exercise (Individual)	Participation + submitted logical framework + individual reflection (pass/fail)
Seminar 9 – Project analysis Reflection on learning (Individual)	Participation + presentation + discussion + individual reflection (pass/fail)
Quiz 3 - Automatically checked practice exercises in Moodle (project management theory and calculations)	Prerequisite for taking the Project Management Exam (Automated feedback)
Construction Investments Exam	% grade
Project Management Exam	% grade

**Prerequisites for completing the programme:**

- Active participation in the Seminars (to achieve more than 50% from Coursework).
- Completion of all 3 quizzes (as prerequisites for taking the exams).
- Completion of both exams.

**Formation of the final grade:**

The final grade is made up of the Coursework (50%), Construction Investments Exam (25%), Project Management Exam (25%).

Activity	Time needed (excluding class time)	Proportion of overall grade	Learning Outcomes covered	Submissions required	Feedback
Assignment 1 – Investment game	2 hours	5%	(General context and understanding)	Completed investment form	Immediate - to ensure that submission is compliant; At mid-semester and end of semester - how did your investments work out compared to other's.
Seminar 1 - CBA input data	30 minutes	2.5%	3	Individual reflection	In-class presentation and discussion of findings; comparative analysis of individual reflections
Quiz 1 – investment metrics	1 hour	0% (Prerequisite for CI exam)	2		Automated system response – level of readiness for CI exam Section B
Seminar 2 – cash flows	30 minutes	2.5%	1, 2	Individual reflection	Comparative analysis of individual reflections
Seminar 3 – Financial CBA	30 minutes	2.5%	1,2,3	Individual reflection	Comparative analysis of individual reflections
Seminar 4 – Economic CBA	30 minutes	2.5%	1,2,3	Individual reflection	Comparative analysis of individual reflections
Quiz 2 – cash flows + risk	2 hours	0% (Prerequisite for CI exam)	1,2,3,4		Automated system response – level of readiness for CI exam Section C
Seminar 5 – qualitative risk analysis	1 hour	5%	4	Qualitative risk analysis result Individual reflection	Discussion and comparison of findings; comparative analysis of individual reflections
Seminar 6 – quantitative risk analysis	1 hour	5%	4	Quantitative risk analysis result Individual reflection	Discussion and comparison of findings; comparative analysis of individual reflections
Seminar 7 – risk management documentation	1 hour	5%	4	Findings Individual reflection	Discussion and comparison of findings; comparative analysis of individual reflections
Seminar 8 - logical framework	2 hours	5%	(General context and understanding)		Relative effectiveness of submitted project proposals; comparative analysis of individual reflections

Seminar 9 – project analysis	4 hours	15%	5,6	Presentation Individual reflection	In-class discussion; comparative analysis of individual reflections
Quiz 3 – PM theory + calculations	2 hours	0% (Prerequisite for PM exam)	4,5,6		Automated system response – level of readiness for PM exam
Construction Investments Exam	(student's choice)	25%	1,2,4	Exam answer paper	Grade (detailed breakdown of grade and feedback on request)
Project Management Exam	(student's choice)	25%	4,5,6	Exam answer paper	Grade (detailed breakdown of grade and feedback on request)

### Academic practices/custom:

As a student at TalTech, you have an obligation to conduct your academic work with honesty and integrity according to the university standards. It is expected that all work that you submit will be your own, and that you have actually done the work that you are submitting. Plagiarism and cheating will not be tolerated. Should you be found to be guilty of such activities, it will be followed with the grade "0" for the assignment/exam and a notice will be filed to the School's Committee for Handling Violations of Academic Practice and Contemptible Behaviour. Depending on the Committee's proposal, it may lead to the Dean issuing a letter of reprimand or, in case of repeated or very severe misconduct, exmatriculation from the university.

## Detailed schedule and topics

The semester schedule is tentative and subject to adjustment.

### SCHEDULE

#### Construction Investments

Date / mode	Part	Title	Contents
29/01 (class + online)		Introduction to the EPX5310 Construction Investments and Project Management course	Course outline, objectives, materials, assessment
	CI-01	Introduction to Construction Investments	Assignment 1 – Investment Game (introduced)
			Context of construction investments
			Definitions
		Introduction to the course case study project	
30/01 (class + online)	Seminar 1	Statistical Data Checking for Cost Benefit Analysis Case Study (Group work)	Group formation / discussion / resolution of issues
			Wiki development
05/02 (online-Moodle only)	CI-02	Investment appraisal metrics	Payback period
			Discounted payback period
			Present values
			Net present value

Date / mode	Part	Title	Contents
			Benefit / cost ratio (Profitability index)
			Internal rate of return
			Modified internal rate of return
	Quiz 1	Automatically checked practice exercises in Moodle (metrics)	
06/02 (online-Moodle only)	Seminar 1 (continued)	Statistical Data Checking for Cost Benefit Analysis Case Study (Group work) Reflection on learning (Individual)	Data checking for FinEst and FEBAD
			Reflection questionnaire
12/02 (online-Moodle only)	CI-03	Cash flows	Cash flows
			Guidelines for capital budgeting
			Capital rationing
			Project ranking
			Problems with project selection
13/02 (class + online)	Seminar 2	Integrated cash flow development (Group work) Reflection on learning (Individual)	Cash flow generation in construction project scenario
			Reflection questionnaire
19/02 (class + online)	CI-04	Cost Benefit Analysis (CBA)	Capital rationing
			Project ranking
			Problems with project selection
			Economic evaluation
			Social evaluation
			Environmental evaluation
20/02 (class + online)	Seminar 3	Checking Financial Cash Flow Calculations for Cost Benefit Analysis Case Study (Group work) Reflection on learning (Individual)	Financial CBA for FinEst and FEBAD
			Reflection questionnaire
26/02 (class + online)	CI-05	Project Finance	Principles of project finance
			Developments and challenges in project finance
			Global importance of project finance
			Project finance - FinEst case study
27/02 (class + online)	Seminar 4	Checking Economic Cash Flow Calculations for Cost Benefit Analysis Case Study (Group work) Reflection on learning (Individual)	Economic CBA for FinEst
			Discussion
			Reflection questionnaire

## Risk Management

Date	Part	Title	Contents
04/03 (class + online)	RM-01	Concept of Risk	Introductory lecture on risk
05/03 (class + online)	Seminar 5	Qualitative Risk Analysis	Qualitative risk analysis exercise
			Reflection questionnaire
11/03 (class + online)	RM-02	Risk in the investment context	Capital Asset Pricing Model
	Quiz 2	Automatically checked practice exercises in Moodle (cash flows + risk)	Certainty Equivalent Approach
12/03 (class + online)	Review of Construction Investments part		
18/03 (class + online)	RM-03	Risk in the project management context	Project risk management
			Qualitative risk analysis
19/03 (online - Moodle)	Construction Investments Exam (mid-semester option) - there will also be an option to take this exam in the Exam Session at the end of the semester.		
25/03 (class + online)	RM-03 (continued)	Risk in the project management context	Quantitative risk analysis
26/03 (class + online)	Seminar 6	Quantitative Risk Analysis	Quantitative risk analysis exercise
			Reflection questionnaire
01/04 (class + online)	RM-03 (continued)	Risk in the project management context	Project risk management documentation
02/04 (class + online)	Seminar 7	Risk management documentation	Risk management documentation exercise
			Reflection questionnaire

## Project Management

Date	Part	Title	Contents
08/04 (class + online)	PM-01	Introduction to project management	Project management definitions and standards
			Project management principles
09/04 (class + online)	Seminar 8	Logical framework	Logical framework exercise
			Reflection questionnaire
15/04 (class + online)	PM-02	Project performance domains	Stakeholder performance domain
			Team performance domain
			Development approach & lifecycle performance domain
			Planning performance domain
16/04 (class + online)	Seminar 9	Project analysis	Selection of project
			Selection of performance domain
22/04	PM-02 (continued)	Project performance domains	Project work performance domain
			Delivery performance domain

Date	Part	Title	Contents
(class + online)			Measurement performance domain
			Uncertainty performance domain
23/04 (class + online)	Seminar 9 (continued)	Project analysis	Analysis of project
29/04 (class + online)	PM-03	Tailoring	Tailoring the project management approach to your specific project
30/04 (class + online)	Seminar 9 (continued)	Project analysis	Analysis of project
06/05 (class + online)	PM-04	Models, methods and artifacts	Commonly used models
			Commonly used methods
			Commonly used artifacts
	Quiz 3	Automatically checked practice exercises in Moodle (project management theory and calculations)	
07/05 (class + online)	Seminar 9 (continued)	Project analysis	Reporting findings, preparing presentation
			Reflection questionnaire
13/05 (class)	Review of Project Management part + Project Analysis Presentations		
14/05 (class)	Project Analysis Presentations		