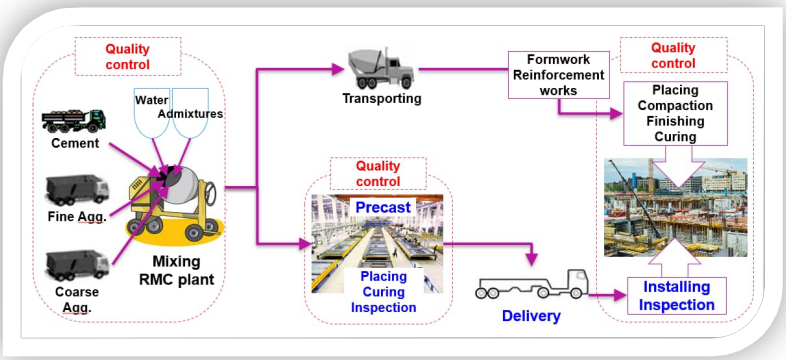

CIV-E2060 Production Technology of Concrete Structures D (5 cr)

Course Syllabus

27.2.2023-19.4.2023

1. Course information

Status of the Course:	Programme Name: Building Technology Major studies; Construction and Maintenance
Level of the Course:	Aalto Eng, master's degree course
Teacher in charge:	Prof. Jouni Punkki Staff Scientist: Fahim Al-Neshawy
Course assistant:	Md. Zahid Hasan Rubel

Teaching Period: IV 2023 (Period IV)

Organization:	Department of Civil Engineering
Grading:	1 – 5
Language:	English

2. Learning Outcomes

Upon successful completion of the course, students will be able to:

1) Understand the manufacturing process of the in-situ and precast concrete structures.
2) Plan the various stages of the in-situ process (different forming systems, reinforcement systems, batching, mixing, placing, curing and finishing of site-cast concrete).
3) Understand the common precast concrete fabrication process (manufacturing of elements, transporting and installing of elements).
4) Apply the practical concreting technologies under extreme environmental production conditions.
5) Perform the quality control of concrete production.

3. Course Content

The course covers the following topics:

- On site concrete production.
- Precast concrete manufacturing.
- Special concretes and concreting under extreme environmental condition.
- Quality control of concrete.

4. Teaching methods

The course includes the following teaching methods and activities:

1) Lectures and expert talks
2) Concrete work plan and concrete production related topics - group assignment and seminar
3) Excursions - (Concrete element factory and construction site)
4) Learning diaries
5) Final written exam

4.1 Lectures and expert talks

The course includes lectures covering the content of the course. These lectures are divided into 2 parts:

1) introductory lecture by the course teachers and
2) concrete industry – expert talks. Expert talks are presented by experts in the field of concrete structures production to introduce new technologies and advancements of the concrete industry.

The lecture schedule is presented in Table 1. The schedule listed in the table is preliminary and may change during the term based on the experts' timetable.

Table 1: Course lectures – schedule

Date and time			Topic	Lecture hall (Kandidaattikeskus)
Mon	27.02.2023	12:00 - 14:00	▪ Introduction to the course	U6 – U149
Wed	01.03.2023	10:00 - 12:00	▪ Special types of concrete	U3 - U141
Mon	06.03.2023	12:00 - 13:00	▪ Concreting site practices (Ready Mix Concrete, pumping, compaction, curing etc.)	U6 – U149
		13:00 - 14:00	▪ Guest lecturer: Ready-Mix Concrete plants – Mika Autio, Rudus Oy	
Wed	08.03.2023	10:00 - 11:00	▪ Related site practices - formworks and reinforcement	U3 - U141
		11:00 - 12:00	▪ Guest lecturer: BRE formworks – Ilari Roihuvuo, BRE Group	
Mon	13.03.2023	12:00 - 13:00	▪ Concreting plan	U6 – U149
		13:00 - 14:00	▪ Guest lecture: Special aspects of infra structures – Jussi Vuotari, Väylävirasto	
Wed	15.03.2023	10:00 - 11:00	▪ Precast concrete production	U3 - U141
		11:00 - 12:00	▪ Guest lecturer: Hollow-core slab production – Mikko Koskinen, Consolis	
Fri	17.03.2023	12:00 – 14:00	▪ EXCURSION – Crown Bridges (Kruunusillat)	
Mon	20.03.2023	12:00 - 14:00	▪ EXCURSION – Hollow-core slab PRE-CASTING factory, HYRYLÄ	
Wed	22.03.2023	10:00 - 12:00	▪ Hot and cold weather concreting	U3 - U141
		11:00 - 12:00	▪ Guest lecturer: Shorcreting – Miika Kalliokari, Oy Rockplan Ltd	

Date and time			Topic	Lecture hall (Kandidaattikeskus)
Thu	23.03.2023	10:15 – 11:00	▪ Guest lecturer: Precast production Design aspects, delivery models. Juha Rämö, Consolis	U3 - U141
		11:00 – 12:00	▪ Key factors involved Quality Control of concrete production	
Mon	27.03.2023	12:00 - 14:00	▪ Guest lecturer: Construction of special concrete structures - Slipform structures and Underwater concrete casting – Esa Kunnassaari, Fimpec Oy	U6 – U149
Wed	29.03.2023	10:00 - 11:00	▪ Guest lecturer: Concrete pipes and manhole – Mika Tulimaa, Rudus Oy	U3 - U141
		11:00 - 12:00	▪ Guest lecturer: Practice QC and requirements – Ari Mantila, The Confederation of Finnish Construction Industries RT (CFCI)	
Mon	03.04.2023	12:00 - 14:00	Seminar I	U6 – U149
Wed	05.04.2023	10:00 - 12:00	Seminar II	U3 - U141
Thu	13.04.2023	10:00 - 12:00	Seminar III	U3 - U141
Wed	19.04.2023	9:00 – 12:00	Course examination	R1 - 160a

4.2 Group assignments

The assignment summarizes existing construction sites concrete production plan. This assignment report include:

1) General description of the construction project (location, exposure class(s), nearest materials and equipment suppliers).
2) Site arrangement (layout of the construction site – principal (basic) layout).
3) Concrete specifications (BY65): basic (typical) mix design, site work (the needed placing, compaction (if needed), curing, strength development (based on maturity age).
4) Production technology: Site related wok (formwork, reinforcement), concreting plan report and quality control testing plan.
5) Safety guidelines (shortly)

The main objective of the assignment is to enable students to combine knowledge related to the production technology of concrete structures. Groups are asked to prepare (i) maximum of 20 pages assignment report including the concreting plan and (ii) a presentation at the course seminar about the assignment. The presentation is max. 10 slides length, and the presentation time is about 15 min included feedback/oral examination.

The weighted grade of the course assignment is 20% of the final grade od the course.

4.3 Excursions - (Prefabricated concrete element factory and construction site)

Two excursions are arranged during the course:

1) Excursion - I (Prefabricated concrete Element Factory)
2) Excursion - II (Construction site)

4.4 Learning diaries

A learning diary is a tool for assessing and developing one's own learning. It helps you describe your own experience, which helps identify weaknesses and strengths related to learning.
This course include:

- 9 learning diaries about the topics of the guest lecturers (maximum of 2 pages per learning diary)
- 2 learning diaries about the excursions to the prefabricated concrete element factory and the construction site.

The weighted grade of the learning diaries is 10% of the final grade of the course.

4.5 Final exam

The written exam includes 4 questions covering the course outcomes. The questions are (short) essay question types. The weighted grade of the final exam is 70% of the final grade of the course.

5. Course Workload

The estimated student workload (5 cr = 135h) includes:

Student activities	Quantity	Duration (Hour)	Total workload (Hour)
Individual work			
Lectures including guest lectures	10	2	20
Weekly assignment session	4	2	8
Course excurions	2	5	10
Learning diaries			
Guest lecturers - learning diaries	9	1	9
Ecxursions - Learning diaries	2	2	4
Group work			
Course assignment			
Assinment work (group meeting, discussions etc.)	3	3	9
Writing the assignment report	1	12	12
Seminar presentation (preparing and presenting)	1	6	6
Independent reading for the exam	1	55	55
Final examination	1	3	3
Total workload (Hours)			136
ECTS Credit of the course (workload / 27)			5

6. Assessment methods and grading scale

The total points of the course are 100 and the grading scale for course is: 5; 4; 3; 2; 1 (lowest); 0 (failed).

Table 2: Course grading

Total points	Grade
<50	0
50 ··· <60	1
60 ··· <70	2
70 ··· <80	3
80 ··· <90	4
90 ··· 100	5

7. Study Materials

Recommended readings for the course:

1) M L Gambhir, (2013). Concrete Technology: Theory and Practice, 5e.
   Aalto University Library: https://www.aalto.fi/en/harald-herlin-learning-centre
   - On site concrete production
     - Chapter 11 – Production of concrete
   - Precast concrete manufacturing

        - Handout to be prepared
    - Concreting under extreme environmental condition
        - Chapter 12. Concrete under extreme environmental condition
    - Quality control of concrete
        - Chapter 09 – Quality control of concrete
2) BY 201 - Betonitekniikan oppikirja 2018 (in Finnish)
3) Course handouts

8. Prerequisites

1) CIV-E1010 Building Materials Technology 5 op
2) CIV-E2020 Concrete Technology L, 5 op