

Course analysis, Spring 2020

II1305 Project in Information and Communication Technology

Course Data

Examiner and coordinator: Fredrik Lundevall.

Teachers: Bengt Koren, Fredrik Lundevall.

Guest lectures by Simone Stefani and Phillip Gajland.

Course dates: Monday, 2020-03-19 through Monday, 2020-06-01.

Registered students: 78. Examined students: 76 (97%).

General

The course is offered in year 2 for two programs: the Swedish-language Civilingenjörsutbildning i informationsteknik (CINTE), and the English-language Bachelor's Program in Information and Communication Technology (TCOMK). All written material for the course is in English.

The course teaches project methods and tools, and lets students with unconnected skills evolve into junior developers who can combine and extend their skills as needed. Students form teams of 5-8 persons. Each team conceives, designs, and implements a project with software, hardware, and/or communications technology. The course involves structured reflection, so that students process their experience into knowledge for the future. An outline is shown in Figure 1

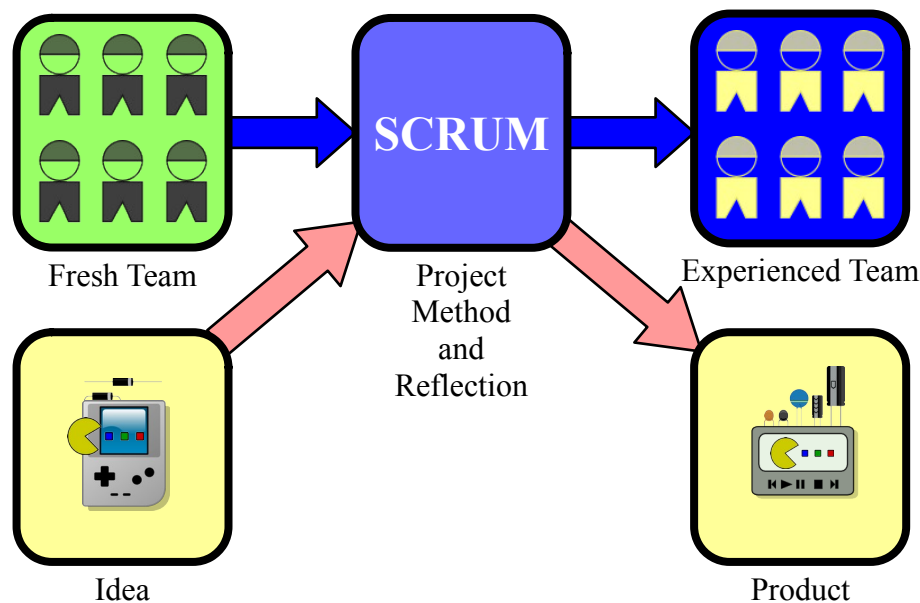


Figure 1. A very simplified outline of the course, in graphical form.

The course has three distinct phases: *preparation*, *project weeks*, and *reflection* (reflection is also a continuous part of the course). In the **preparation phase**, students form teams and read up on methods and tools (Scrum and Git). The teams discuss product ideas with a teacher, who must sign off on the product idea before the project begins. The preparation phase is shown in a simplified, graphical form in Figure 2

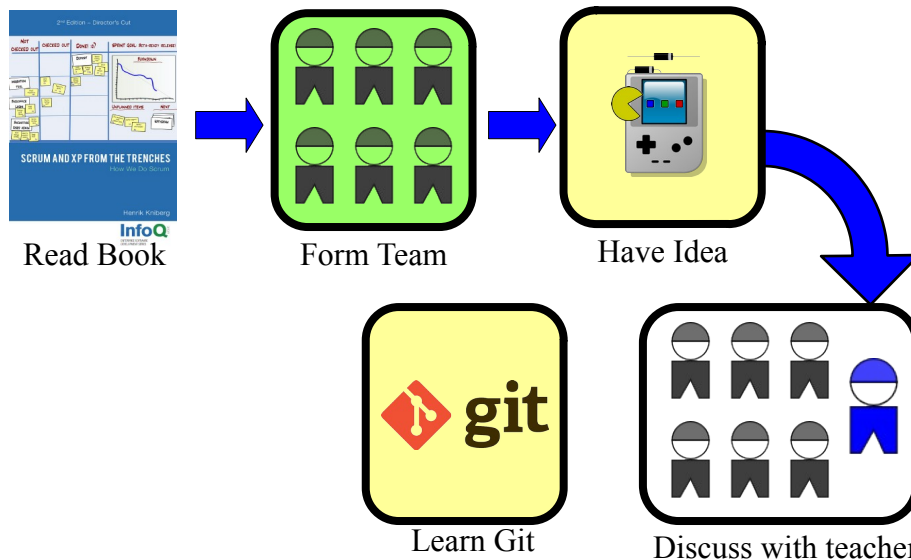


Figure 2. A simplified, graphical representation of the preparation phase of the course.

Teams are formed by the students, but the examiner has the last word on who goes in which team. As part of the preparation phase, all teams must create a so-called *social contract* for the team. The social contract contains rules of conduct for a productive collaboration.

To ensure that all course participants know the most important methods and tools, quizzes in Canvas test specific parts of the book, or tools such as the Git version-control system. Students must finish all quizzes successfully during the preparation phase, before the project weeks.

Git is the version-control system used in the course. Seminars on Git and testing are given by former students Simone Stefani and Phillip Gajland.

Each team is encouraged to invent a product idea, through brainstorming and other structured creative activities. Project-ideas from external stakeholders are welcome. Some students have contact with external stakeholders. In all cases, a teacher has the final word on which project idea should be implemented during the project weeks.

In the **project weeks**, teams work in four so-called sprints. Each sprint is one week long, and starts with a session of structured planning. The sprint ends with a demonstration, followed by a session of structured reflection.

The session of structured reflection is called a *sprint retrospective*. This is a one-hour meeting with structured discussion about the team's way of working during the sprint, focusing on possible improvements. The sprint-retrospective sessions need guidance from teachers, at least the first time.

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During the sprints, students work weekdays from 08:00 through 17:00, with a one-hour lunch break. The regular hours help ensure good communication within each team, and simulates actual developers' work-hours.

Prior to 2020, each team has a designated workplace in a dedicated room. In 2020 the course was redesigned to be an online course. Students were expected to work from home, and to communicate using Zoom and other tools. This change is discussed in the section "Analysis by the examiner".

The final phase of the course is the **reflection phase**. Immediately after the project-weeks, there is a two-hour expo, where all teams show their products to the general public. In 2020, the expo was an online event.

Following the expo, there is a week during which each student writes an individual reflection, to be handed in to the examiner.

To summarize, the course lets students perform real development work in a controlled environment. The three phases of preparation, project weeks, and reflection is part of a general pattern. The same pattern is repeated within each single project week: plan and try, demonstrate and then reflect. This pattern can be described as “**plan – try – reflect**”. Reflecting on mistakes, and learning from them, is a very powerful learning activity, that is employed throughout the course.

Students' view of the course

The students gave their view of the course mainly in two ways: through comments in their individual reflections, and through a learning experience questionnaire. One student applied for the course evaluation board. There was an online course meeting, with this student and the teachers as participants.

The **learning experience questionnaire** was open from 2020-05-25 through 2020-06-08. The questionnaire was filled-out by 12 out of 78 students – an answer rate of 15%.

In the questionnaire, most questions have the form of statements. For each statement, respondents indicate their degree of agreement on a scale of 1 through 7. There are also comment fields for each statement. Statements are worded so that a higher score indicates “better”.

Statements in the questionnaire fall into three categories: Meaningfulness (statements 1 through 6), Comprehensibility (7 through 16), and Manageability (17 through 22). The average response to the statements are shown in Figure 3

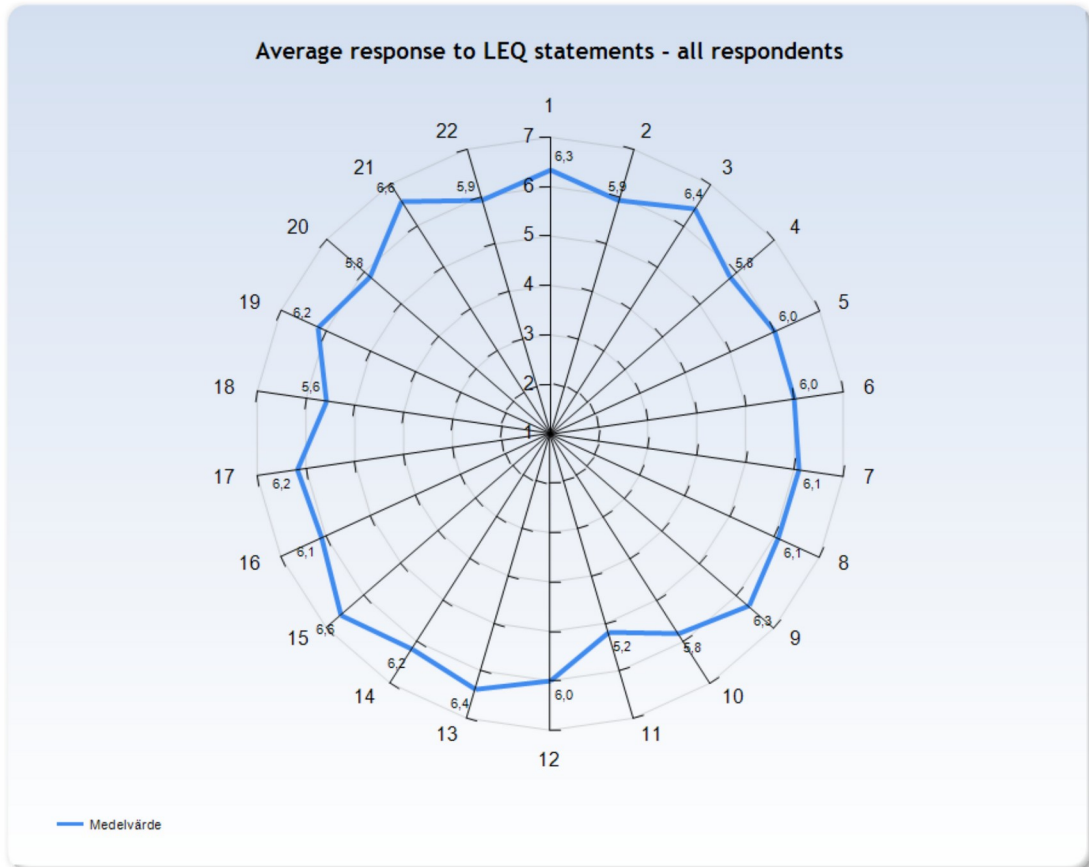


Figure 3. Average responses to learning experience questionnaire for II1305, 2020.

The respondents were very positive to the course. The Meaningfulness responses go from 5.9 to 6.4, indicating that students find the course highly relevant. The Comprehensibility and Manageability responses also have very high averages.

A few questions in the questionnaire do not have statements to agree with (or disagree with). These questions include group membership, workload, gender, and type of student. There are also four general questions, with only comment-fields. These questions are: “What was the best aspect of the course?”, “What would you suggest to improve?”, “What advice would you like to give to future course participants?”, and “Is there anything else you would like to add?”.

In response to the question “Is there anything else you would like to add?”, one answer was: *“Good job Fredrik and Bengt. Best course I've had so far, very fun to work and the format of the course was great”*. One answer to “What was the best aspect of the course?” was: *“We got to put to practice the knowledge gained in our program”*.

In response to the question “What would you suggest to improve?”, more than one student suggested more teaching of Scrum before the project-weeks. There were also suggestions that the work-hours be changed, or reduced to make room for paid work outside KTH.

When writing the **individual reflections**, many students added comments on the course. These additional sources confirm the overall positive reception of the course, and also give additional suggestions.

Several comments in the individual reflections concern software for communication within the team. KTH uses Zoom, which works well for formal meetings. For continuous, informal discussions during software development, several students suggested Discord as a supplement. Discord is a proprietary online platform for instant messaging, chatting, voice calls and video calls. There is Discord software for Microsoft Windows, Apple MacOS and IOS/IpadOS, Android, and Linux. Discord is not endorsed by KTH, nor connected to KTH in any way.

More than one student reported using Zoom as a kind of broadcast medium: all team members would have the microphones off, and the speakers on. When something came up that was relevant to the whole group, a team member would switch on the microphone and call the team to a short meeting.

Some teams worked with their cameras on, to increase informal contact between team-members. Most teams, however, preferred to have the cameras off, except during formal meetings.

During the sprints, students work weekdays from 08:00 through 17:00, with a one-hour lunch break. Comments on this were both positive and negative. More than one student commented that more breaks were needed.

To summarize, the students are very positive to the course, and feel that they learn a lot during the course. As always, there is some room for improvement.

Analysis by the examiner

II1305 is a mature course, evolved from earlier courses that were originally offered since 2005.

The greatest change in 2020 was the move to an online course. The course literature states that the first and foremost guideline for a team is: "Seat the team together!", expanded into three bullet-point requirements. The three requirements are quoted here, with clarifications by the examiner of II1305 shown in square brackets.

- *Audibility: Anybody in the team can talk to anybody else [in the team] without shouting or leaving his desk.*
- *Visibility: Everybody in the team can see everybody else [in the same team]. Everyone can see the task board [which shows tasks in progress, and other things; the task board is typically on a wall]. Not necessarily close enough to be able to read it, but at least see it.*
- *Isolation: If your whole team were to suddenly stand up and engage in a spontaneous and lively design discussion, there is nobody outside the team close enough to be disturbed. And vice versa.*

Source: Henrik Kniberg, *Scrum and CP from the Trenches – How We Do Scrum, 2nd Edition – Director's Cut* (InfoQ, 2015).

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Working online in a distributed environment means that the three requirements have to be met by other means. In 2020, students mainly had to find these means by experiment.

The audibility requirement seems to have been best met by those teams using Zoom for broadcast, and Discord for conversations in smaller groups. Other teams used the breakout-room feature in Zoom. Breakout rooms in Zoom have some disadvantages; perhaps the most important disadvantage is that members of one break-out room have no way of communicating with members of another break-out room.

The visibility requirement was met by those teams who chose to leave their cameras on during the day. Other teams preferred having their cameras off, to work more privately.

The isolation requirement was met by all teams. In principle, when students are working from home they could be disturbed by others sharing their living arrangements. No such problems were made known to (or observed by) the teachers during the course.

Some students suggested that the rules for absence should be changed. The current rules are, that absence up to 8 hours (one day) is made-up for by extra work that the student decided together with the team, while an absence from 8 hours and up to 40 hours (one week) requires an individual task to be completed after the course. The suggestions were, that sick-leave should be allowed, or that a longer absence than one day should be allowed before requiring the individual task.

The action-points for 2020 were as follows.

Action point 1 for 2020: Have fewer teams in the same room, but keep the large rooms.

Action point 2 for 2020: Suggest coming to work with an infection as something to discuss when setting up the social contract.

Action point 3 for 2020: Consider modifying the rules for absence.

All action points were implemented in the planning stages of the course. In February, 2020, the restrictions and social-distancing requirements caused by the Covid-19 pandemic made it necessary to move the course to an online course. This move made actions points 1 and 2 irrelevant.

For action point 3, a three-part rule was designed. The new rule can be summarized as follows.

Being absent for 1 day or less is still a matter for the team only. An absence of 4 or 5 days still requires extra work in June, typically to create some form of report. For an intermediate absence of 2 or 3 days, extra work must be agreed on with the examiner; however, this extra work need not be in June but can happen during the project weeks.

The implementation of action point 3 is still in effect. The experience from work-places in general during 2020 is, that people working from home are very rarely on sick-leave. This also seemed to apply to students in the course, so the new rules have not been put to the test during 2020.

In summary, the course is very well received. Areas where students suggest improvements are taking breaks, and intra-team communication software and procedures.