



University of Applied Sciences

SEMESTER GUIDE
Semester 1
Course-based learning

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Introduction

Welcome to semester 1 course-based at Fontys ICT.

In this semester the education is designed according to the principles of course-based learning. The focus lies on learning in the context of real-life tasks, and on clarity and predictability concerning learning outcomes, educational activities and assessment. At the beginning the education is more teacher-driven, and gradually you will take more ownership of your own learning process. You will first learn the basics of ICT within the context of examples and tasks that you will encounter in your later work as an ICT professional. From this base, you will be stimulated to make well-founded choices about your own learning path.

The learning environment is organised in such a way that you interact closely with your teachers and fellow students. The physical learning environment, also called Open ICT Lab (OIL), consists of classrooms for planned lessons with your class, but also of more general areas for supported self-study, working on assignment & projects, learning and meeting up with fellow-students and teachers.

Content

The focus of this semester is on orientation on the field of ICT, making a choice for the ICT profile that suits you best, and making a start on your further development in this profile. In doing so you will also develop professional skills that are relevant to all ICT professionals. During this semester you will orient on and make a choice out of the following profiles:

- ICT & Business
- ICT & Infrastructure
- ICT & Media Design
- ICT & Software Engineering
- ICT & Technology

In the first 12 weeks of the semester you will orient on these five profiles, and develop knowledge and skills that are relevant to all students, whichever profile you choose to advance in. From week 13 you will continue with the profile of your choice and develop a more advanced level in this (see figure 1 below, for an overview of the semester).

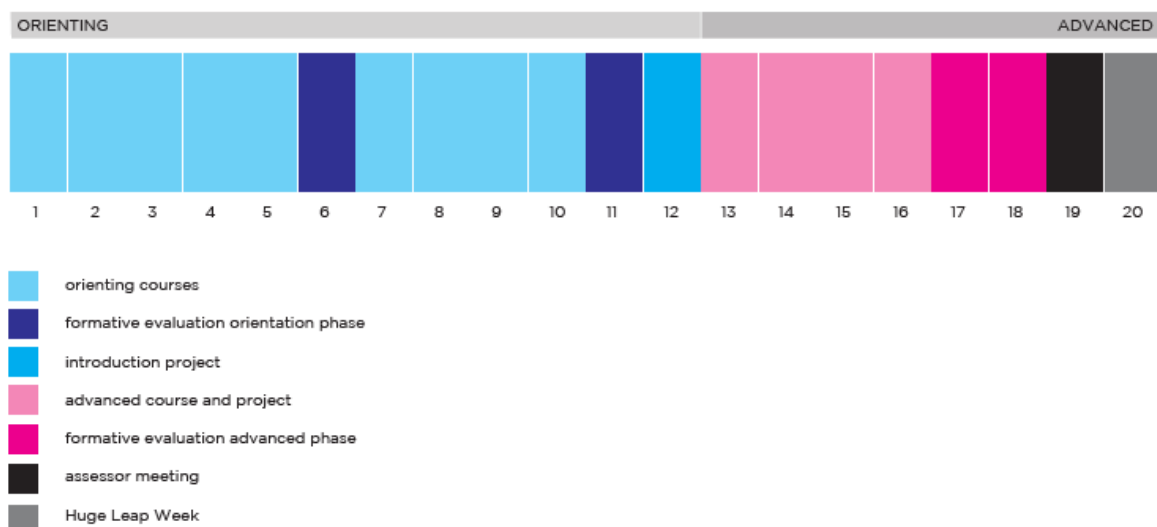


Figure 1: Semester 1 course-based

In the following sections you can find a description of Professional Skills and the five ICT profiles, plus an overview of the related learning outcomes and assessment criteria. These learning outcomes describe the level you are expected to reach during this semester, and form the entrance level to Semester 2.

Professional Skills

At Fontys ICT you are preparing for your professional life in a field that evolves continuously. Because of this an ICT-professional will also continuously need to develop. To support this process, during your studies, you will also work on your professional skills, such as: learning skills, justifying choices, and communication skills.

Professional skills learning outcome You display professional behaviour in the areas of making judgements, communication and learning skills.
Explanation Making judgements You justify your choices when carrying out assignments. Communication You report correctly in writing on assignments. You present clearly and convincingly on assignments. You collaborate effectively with fellow students. Learning skills You look back on your development, look at what's coming and describe your professional talents and ambitions for further development related to your ICT-programme. You are open to feedback on your own performance in your studies, and adjust your behaviour accordingly.

ICT & Business

IT innovations make that companies have to adapt their business process. The goal in most cases is to reduce cost or time. For example a supportive system for patient administration in a hospital, standardized system to report problems with your car, or a banking system you can use from your phone. With these innovations IT has an impact on the life that we have. These changes have two things in common: they are costly to implement, and they require a change in the process. Companies want to be able to steer their new IT implementations, being able to use them efficiently and to gain new insights within their process. For example when a supermarket introduces a new scanning system for their products, they can save on employees cost. On the other hand the customer is now charge of scanning the products. The question at hand, “Is this really a beneficial change?”. With the gathered data and a process analysis the ICT and Business expert is able to determine whether this is true and give a funded argument. Being able to see the whole picture of the organization, collecting and organizing the data, and analysing the process is what you will work on during the upcoming period. You will learn that these topics cannot go without each other.

ICT & Business learning outcome

You demonstrate how to convert data into information in order to achieve a recommendation that will make an improvement for a process in an organization.

Explanation for Orientation

Improving an organisation

Using the offered models you can describe a business process and you can indicate the bottlenecks.

Converting data into information

You process raw data into information, based on simple data modelling and provided tools

Advice

You provide a substantiated advice based on your data analysis and process description.

Explanation for Advanced

Improvements for an organisation

With the aid of available models and tools you create an IST design of a business process. based on a bottleneck analysis you create a SOLL design. You describe how the agreed key performance indicators can be achieved.

Converting data into information

You analyse and transform raw data from the source into meaningful information for a client, based on a data model of your own design.

Advice

You provide a substantiated and sustainable advice to improve an organisation for the client.

Substantiated documentation is provided in the form of legitimate literature and by using data analysis. Sustainability is created by showing the long term impact on the organization by the advice. The advice should be compact and to the point when presented.

ICT & Media Design

ICT & Media Design is about coming up with ICT-based media concepts, transferring stories to your goal audience, and developing applications that are meaningful to your target audience. The core part of this profile is for you to learn how to design for the user experience, so you will be able to develop and implement interactive prototypes in an iterative process for the target users based on trends and developments. You get the opportunity to experiment and develop your technical and creative talents.

ICT & Media Design learning outcome

You are able to develop and implement interactive prototypes in an iterative process for the target users based on trends and developments.

Explanation for Orientation

Trends and developments

You orient on the actual state of affairs in the area of digital experience design and technology. This may include big data, mixed reality and artificial intelligence. You collect examples of these from daily life.

Iterative process

After having received feedback from users and experts, you repeatedly implement changes with the aim of improving your product. You show these iterations and the collected feedback in your work process.

Interactive prototypes

You have made prototypes to develop the interaction of your product. You use HTML and CSS as programming languages.

Explanation for Advanced

Trends and developments

You have studied the various developments in the area of digital experience design. You have formed an opinion about it. Based on this you justify your choice of study direction in this domain.

Iterative process

You show iterations in the work process and you explain how feedback from users and experts has contributed to your design choices. Your design meets the needs of the end user and is aesthetically justified.

Interactive prototypes

You make digital products that create a specific, purposeful interaction between human and machine. As input for this you have made sketches, wireframes and prototypes. You make use of, among others, HTML, CSS and other programming languages.

Target group

You provide insight into the interests and needs of the end user.

ICT & Infrastructure

ICT & Infrastructure is about being able to manage the existing IT infrastructure in all its facets and being able to design and realise a new infrastructure. This concerns both the technical side (network and server environments, cloud, IT environments, security), and the business side (agreements, costs, privacy considerations, organisation). ICT infrastructure is understood to mean the totality of IT resources that handle the processing, storage and transport of digital data. In the first semester you will become acquainted with the basics of IT infrastructure, and learn to develop a secured network environment.

ICT & Infrastructure learning outcome

You demonstrate a self-developed, secured network environment with hosts and servers based on a specific application requirement (services).

Explanation for Orientation

Develop and demonstrate

You create and demonstrate a working web service or other network service that can be accessed from inside and outside of the local area network (LAN)

Server and network environment

You can design a simple network.

You can explain how the client-server communication works.

You can apply hardware-visualisation techniques.

Security

You have taken the basic security setting components into account.

Explanation for Depth

Develop

You have carried out an analysis, design and realisation phase. You create and demonstrate a working service on the network which is accessible from various networks, and add justification of your choices. You are capable of implementing extra services on your network (for example NAT).

Demonstrate

You show a working service exposed to client(s) that runs as a specific application on a small network environment. You can adjust the configuration and describe the impact on the environment. You justify the chosen network components.

The server and the network environment

You analyse requirements in order to make a network design with a network drawing.

You create a server and network environment in a virtual infrastructure.

You are able to apply various configurations and determine the impact on the environment.

Security

You analyse the security factors of a self-developed infrastructure and can draw a conclusion from it.

ICT & Software Engineering

In the ICT & Software profile you will learn how to develop complex software systems. In the first semester it is all about the basics of programming. With the basic programming concepts you will start writing very simple software applications. During the course it will become clear that Software Engineering is more than just programming. You will learn different techniques to create software applications in a structured manner. It is important that you practice a lot in the orienting phase and this way develop your analytical skills, which are essential for a software developer. Enthusiasm and perseverance are also important ingredients to become a skilled software developer. You will use the acquired programming knowledge also in the other profiles/streams to create meaningful products. In the advanced phase of the first semester you will make a start with developing software applications using object oriented design and implementation concepts.

ICT & Software Engineering learning outcome You develop software applications with attention for algorithmics and hereby demonstrate the basic skills of object-oriented programming.
Explanation for Orientation Attention for algorithmics You can write simple software applications that in a step-by-step manner find solutions to problems by performing logical tests and simple, stepwise calculations. Basic skills You comprehend and apply the following programming concepts: variables, conditional statements, loops, methods, lists/arrays and enums. Demonstrate You ask a teacher to provide feedback and show that you have followed up on the feedback.
Explanation for Advanced Attention for algorithmics You can write simple object oriented software applications that in a step-by-step manner find solutions to problems by performing logical tests and simple, stepwise calculations. Basic skills You comprehend and apply the following programming concepts: objects/classes, constructors, private fields/encapsulation, get/set- methods and/or properties, method/constructor overloading, class diagrams/relations/multiplicity (in addition to <i>basic skills orientation</i>). The focus hereby is on the readability (e.g. naming conventions, indentation) and the maintainability of your software programmes. You design a class diagram (with explanation) which shows the most important classes and their interrelationships. Demonstrate You ask a teacher to provide feedback and show that you have followed up on the feedback.

ICT & Technology

ICT & Technology is the profession of developing software for other platforms than standard PC's. These platforms, named Embedded Systems, often have a strong link with the physical world. This course is an introduction to programming on an embedded platform such as the Arduino. You can connect different types of sensors and actuators to this platform. You can use these sensors to get information about the outside world, and use actuators to influence the physical surroundings. This interaction requires you to make assumptions about the physical world and confirm your results with live tests.

ICT & Technology learning outcome

You develop and programme interactive embedded systems in which you use sensors and actuators and apply various I/O techniques.

Explanation for Orientation

Interactive embedded systems

You compile and develop a system which comprises different component such as a micro controller board, sensors and actuators.

Your system can communicate with another system using your self-defined protocol.

Programming

You understand and apply the following programming principles: variables, conditional statements, loops, functions, arrays.

The focus is to make a working product.

Sensors

You can apply and use sensors such as a button, potentiometer, distance sensor etc..

Actuators

You can apply and use actuators such as led, buzzer, motor.

Various I/O techniques

You can apply various types of I/O techniques such as digital input and output and analogue input.

Explanation for Advanced

Interactive embedded systems

Your product can communicate with another systems using your self-defined protocol that supports parameters and which can handle invalid messages.

Programming

You apply all imperative programming concepts and the following Object Oriented concepts: objects, classes and encapsulation, i.e.: constructors, private fields, properties en methods.

The focus is on developing readable (e.g. naming and indentation), maintainable code and a robust product.

Sensors en actuators

You apply extra sensors and actuators which you made an analysis of.

Various I/O techniques

Besides the mentioned I/O techniques you can also apply pulse width modulation and interpret and apply analogue input.

Assessment

How is semester 1 course-based assessed?

At Fontys School of Information and Communication Technology, we use learning outcomes as the base for the integral semester assessment. By the end of semester 1 you need to have demonstrated that you have achieved the learning outcomes. By the end of week 12 you demonstrate orientation level for all five profile learning outcomes, based on your overall development during the five orienting level courses and the introduction project. From week 13 you continue to develop towards the advanced level for one (or more) of these profiles of your choice. By week 18 you demonstrate the advanced level for the learning outcome of your chosen profile, and your level on the Professional Skills learning outcome. See the figure below for an overview of the assessment in semester 1 course-based.

Assessment Semester 1 Course Based

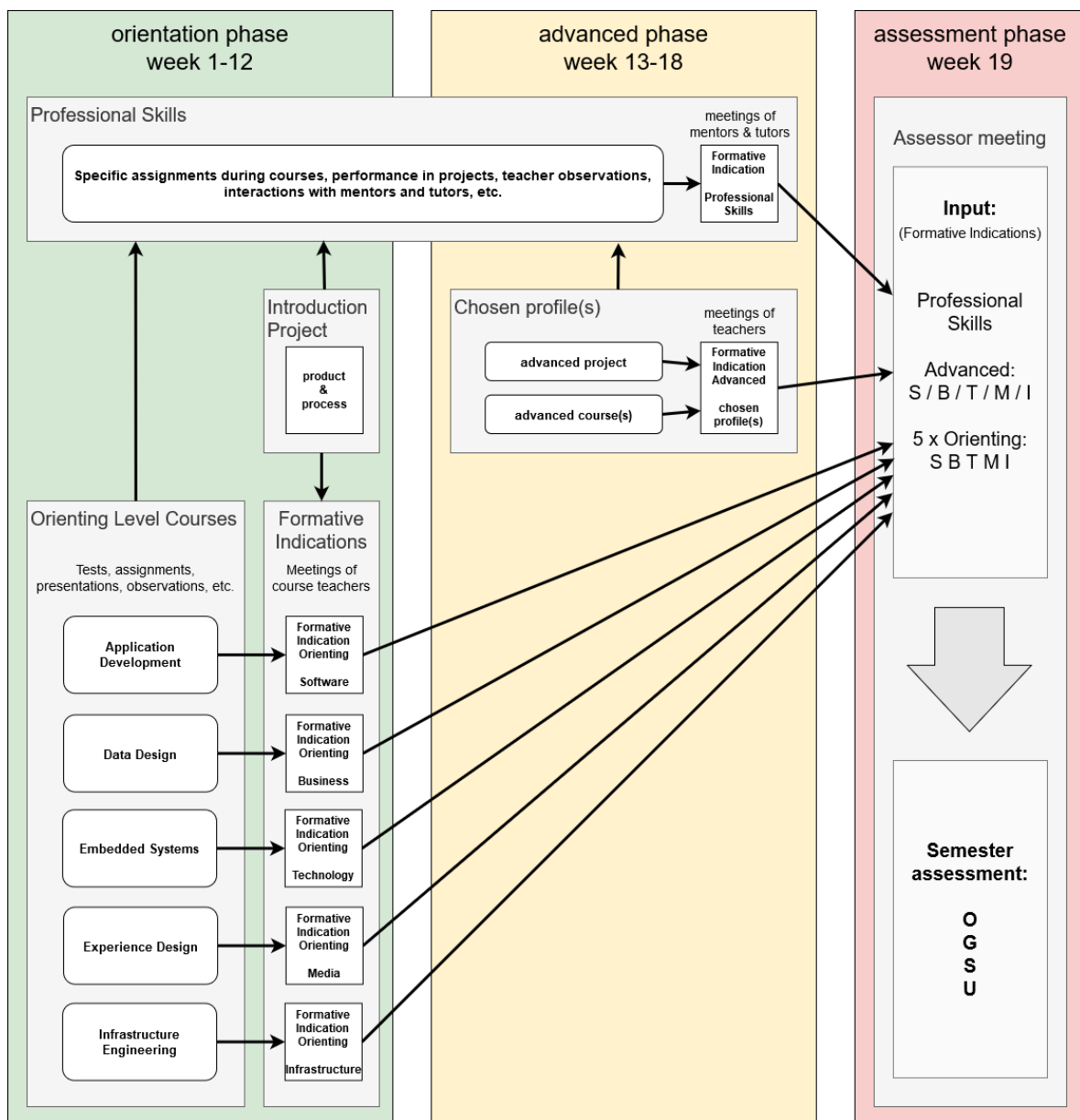


Figure 2: Overview of assessment semester 1 course-based

Formative indications for the learning outcomes (week 12 and week 18)

A formative indication is a development-oriented, interim evaluation, that is used as input for the assessor meeting. In this meeting the assessors use all the formative indications to decide on the summative, integral semester assessment. The formative indications are based on all information that is available about your development during the semester. This includes: assignments, tests, demo's, teacher feedback, observations, etc. During semester 1 you will receive the following formative indications as specified below.

Week 12	5 formative indications on orienting level for the learning outcomes of all profiles: <ul style="list-style-type: none"> • ICT & Business • ICT & Media Design • ICT & Infrastructure • ICT & Software Engineering • ICT & Technology
Week 18	<ul style="list-style-type: none"> • 1 formative indication on advanced level for the learning outcome(s) of your chosen profile(s) • 1 formative indication for the learning outcome Professional Skills

Every learning outcome is valued according to the decision guidelines below. Based on these decision guidelines all learning outcomes will be expressed in terms of the following formative indications: Outstanding (O), Good (G), Satisfactory (S), Unsatisfactory (U), Poor (P).

Valuation	Explanation
Outstanding (O)	You have demonstrated the learning outcome at an outstanding level. This means that you have shown your development at the level described in the explanation of the learning outcome. And, on top of that you have shown a significantly higher development on several of the assessment criteria.
Good (G)	You have demonstrated the learning outcome at a good level. This means that you have shown your development at the level described in the explanation of the learning outcome.
Satisfactory (S)	You have demonstrated the learning outcome at a satisfactory level. This means that you have <i>not</i> shown your development at the level described in the explanation of the learning outcome, but that you have shown sufficient level.
Unsatisfactory (U)	You have <i>not</i> demonstrated the learning outcome at a satisfactory level. This means that you have <i>not</i> shown your development at the level described in the explanation of the learning outcome, and that you are missing one or more essential aspects in your development.
Poor (P)	You have <i>not</i> demonstrated the learning outcome at a satisfactory level. This means that you have <i>not</i> shown your development at the level described in the explanation of the learning outcome, and that you are missing many essential aspects in your development.

Summative, integral semester assessment (week 19)

Based on the valuation of the learning outcomes, the assessors (= all involved teachers) decide during the assessor meeting in week 19 on your integral semester assessment result. The guidelines below are used to decide on this result. In well-motivated cases, the assessors can deviate from these guidelines.

Pass (30 EC)	Outstanding (O)	1 profile learning outcome advanced level: at least good 5 profile learning outcomes orientation level: at least good Professional Skills learning outcome: at least good
	Good (G)	1 profile learning outcome advanced level: at least good 5 profile learning outcomes orientation level: at least satisfactory Professional skills learning outcome: satisfactory / good
	Satisfactory (S)	1 profile learning outcome advanced level: satisfactory 5 profile learning outcomes orientation level: satisfactory Professional skills learning outcome: satisfactory
Fail (0 EC)	Unsatisfactory (U)	< Satisfactory (S)

Permitted tools and aids

Within the courses and projects you will receive specific information about permitted tools and aids. You can find general information on this in the 'Exam procedures and fraud policy', available on Student Square (Fontys ICT portal).

Retakes or repair

During the semester you work on learning activities to develop towards and show the expected level on the learning outcomes. You have several opportunities to demonstrate your level, and will receive feedback on how your development progresses. As described above, in week 12 and in week 18 your teachers will evaluate your level on the learning outcomes. If by week 12 you have not yet demonstrated a satisfactory or higher level for one of the orienting level learning outcomes, your teachers can decide to give you an extra opportunity to develop and demonstrate your level on this during the advanced phase of the semester. Several course teachers will together discuss and decide on these cases. You will only be given this opportunity if the teachers' estimate is that you are able to reach the required level within a maximum of 15 hours additional study load. It is not possible to receive an extra opportunity to develop and demonstrate your level on the chosen profile advanced level or the Professional Skills learning outcome, if you have not shown this by the end of week 18.

If you fail the semester, you can retake it all during the following semester.

How is the assessment determined?

During the assessor meeting in week 19, the summative, integral semester assessment is expressed as: Outstanding (O), Good (G), Satisfactory (S), or Unsatisfactory (U). Outstanding (O), Good (G), and Satisfactory (S) result in the assigning of 30 EC and admittance to semester 2 of the chosen advanced level profile. Unsatisfactory (U) results in doing a retake semester. You receive 0 EC, and are not admitted to semester 2.

In case the grading procedure was not followed correctly or invalid criteria have been used to determine the grade, you can appeal to the Exam Board. Before doing this, we advise you to contact the teacher(s) concerned in the grading to ask for further clarification. If you decide to send an

appeal to the Exam Board, you need to be explicit about which part of the procedure was not followed or which criteria were used for grading. Simply disagreeing with the examiner is not a valid reason to appeal. You can contact your mentor for more information about appeals.

Advancement decision

At the end of the semester, based on the decisions taken at the assessor meeting, the exam board will place you in your follow-up semester. This will be one of the following options:

- You have completed the semester: You receive 30 EC and are admitted to semester 2 of the profile you chose for your advanced level.
- You have *not* completed the semester: You receive 0 EC and are *not* admitted to semester 2. You can retake semester 1 (semester 1 is scheduled both during the Fall and the Spring semester).

Binding study advice

After 12 months of studying at Fontys ICT, you receive a binding study advice. You need to receive a *positive* binding study advice to be allowed to continue studying here. There are two options:

- You have completed semester 1: You receive your positive binding study advice, and can continue studying at Fontys ICT.
- You have *not* completed semester 1: You need to leave Fontys ICT.

Learning activities

Semester 1 is made up of many different learning activities, organised in courses and projects and divided over an orientation phase and an advanced phase. During this semester you are guided by your mentor, both individually and as part of a group of fellow-students. Your mentor is a teacher who will help you to get on track with your studies, guide you on the development of your professional skills (which you will develop during the courses and projects), and guide you on deciding which profile best matches your interests and talents.

Orientation phase (week 1 – 12)

During the orientation phase you participate in five courses and one introduction project.

Orienting level courses

The five orienting level courses are the following:

- Application development
- Embedded Systems
- Experience Design
- Infrastructure Engineering
- Data Design

The orienting level courses correlate strongly to the five profiles and will help you choose the field of ICT that interests you most and matches your talents. However, in these courses you are also introduced to basic skills and knowledge that are relevant to all ICT professionals, whichever profile you decide to choose later on in your studies. The learning activities are placed in the context of real-life tasks, to show the relevance to your future working life. All courses have weekly lessons. Alongside this, teachers will be available for supported self-study hours.

Note: You can find all the detailed information about the content, learning materials and assignments of these courses in the related canvas courses.

Introduction project

The introduction project is a strongly guided small group project in which you get a first experience of what it means to work in an ICT project, and you get a feeling for how the different ICT profiles are related. The project also gives you the opportunity to further develop your professional skills, such as working in a team, and prepares you for your project during the advanced phase.

Advanced phase (week 13 – 18)

Before the start of the advanced phase you make a choice of the profile you want to further develop. From week 13 onwards you participate in a course focused on developing knowledge and skills related to the advanced level criteria of the related learning outcome of the profile of your choice, and you work on your Advanced Project. During this project you work together in a group with a few other students. Within the project you need to focus on the aspects that are related to your choice of profile, but also ensure that you work together as a team, and work towards a group solution for the problem.

Summative Assessment (week 19)

All the work you did and the development you showed during the orientation and the advanced phase are assessed by your teachers. The assessor meeting takes place without the students. You will be informed about the outcome of the assessor meeting by your mentor. The official result will follow after the exam board has formalised the assessment decisions.

Huge leap week (week 20)

During the last week of the semester you have the opportunity to participate in workshops and other sessions organised by your fellow students (and perhaps by you too). These sessions can be on all kinds of topics that are relevant to the IT profession. You will get to meet and discuss with students from all years, teachers, and our Partners in Education (companies that we collaborate with in our education).

Quality assurance

Every semester we evaluate our education to continually improve it, and we will organise sessions with you during the semester for this. Your feedback and suggestions are invaluable. We would therefore greatly appreciate you giving us an insight into your experiences while studying with us. You can always give your feedback to your mentor, your course teacher, or your project tutor. But also feel very welcome to share your thoughts and experiences with the semester 1 unit coordinators (Basjan Schouwenaars, b.schouwenaars@fontys.nl, & Christina Morgan, c.morgan@fontys.nl), either in person or by mail.

Below you can find a summary of the feedback and suggestions we gathered last semester, and the changes made to the semester based on this:

Students and teachers pointed out that during the orientation phase there were too many activities and assignments alongside each other. These were related to seven different canvas courses: five orienting level courses, the Introduction Project and the professional skills assignments. This led to a loss of focus, and a feeling of overload. The feedback was that the overall workload during the semester matched the expected average of approximately 40 hours per week, but that there were a few peak moments with too many deadlines at the same time.

During the 12 week orientation phase the students are introduced to the five profiles. We have organised these as five parallel courses, and choose to keep it organised in this way. But, we have made changes to the run-time of the courses, and to the scheduling of the Introduction Project and

of the professional skills assignments. The five orienting level courses will now run for 11 weeks, and thus be rounded off before week 12. The deadlines for the assignments for the different courses will be coordinated to divide the workload better over the 11 weeks. And students work on their professional skills during the courses, but these will be organised as an integral element of their course assignments, and not as extra assignments alongside. The Introduction Project will not be planned during the first 11 weeks; the whole of week 12 will be reserved to work on this and on related professional skills assignments.

There was also feedback concerning some of the orienting level courses. This led to several changes and updates to the courses. A few of the main changes are related to the following:

- The set-up of the first phase of the Data Design course, concerning DataCamp
- The level of the first assignment of Embedded Systems was deemed to be too high.

There was also quite some feedback concerning the scheduling of the self-study hours. In principle students appreciate the fact that they have the opportunity for supported self-study (teacher time & class room), but many students would like these hours to be scheduled differently. Currently the lessons and self-study are planned intermittently. Many students expressed that they would prefer for the lessons to be planned adjacently, rather than have the self-study planned in between the lessons. This would give students the opportunity to decide more for themselves when, where and how they study, and to organise their studies in a way that best matches their way of working. Also, there seemed to be too many hours planned for supported self-study. In this upcoming semester we will schedule 10 self-study hours as opposed to 20 hours last semester. And we will no longer plan the self-study time rigidly in between the lessons. But, due to the availability of teachers and classes, it is still likely that some of the self-study hours will be scheduled between lessons.

Appendix A. Planning of the semester

Study week	Date	Activities
1	Feb 10 - 14	Introduction to your class & mentor Start of orienting level courses
2	Feb 17 - 21	Orienting level courses
Holiday	Feb 24 - 28	Carnival holiday
3	Mar 2 - 6	Orienting level courses
4	Mar 9 - 13	
5	Mar 16 - 20	
6	Mar 23 - 27	Formative evaluation orienting level
7	Mar 30 – Apr 3	Orienting level courses
8	Apr 6 - 9	
9	Apr 14 - 17	
10	Apr 20 - 24	Week 10: Deadline sign-up for advanced level profile
Holiday	Apr 27 – May 1	Spring holiday
11	May 4 - 8	Formative evaluation orienting level
12	May 11 - 15	Introduction Project
13	May 18 - 20	Advanced level course & project
14	May 25 - 29	
15	Jun 2 - 5	Week 15: Deadline sign-up for semester 2 profile
16	Jun 8 - 12	
17	Jun 15 – 19	Formative evaluation advanced level
18	Jun 22 – 26	
19	Jan 29 – Jul 3	Assessor meeting: no classes
20	Jul 6 - 10	Rounding off: no classes