Course description

General information		
Course leader	**Raphael CHRIQUI and Thomas DE BEAUCHENE**	
Course title	**DevOps Level 2 – Kubernetes and Orchestration**	
Study programme	**Title of Expert in Information Technology**	
Course status	**Graduate Program**	
Year	2	
Number of credits and mode of teaching delivery	ECTS student workload coefficient	3
	Number of hours (L+E+S)	(6+8+56) 70

1. COURSE DESCRIPTION

1.1. Course objectives

The module "DevOps Level 2" focuses on Kubernetes and Orchestration.

1.2. Conditions for enrolment in the course

- Have a basic understanding of DevOps, Networking and Linux Server Management.
- Have a good understanding of Docker.

It is recommended to take the module "DevOps Level 1" prior to the module "DevOps Level 1".

1.3. Expected learning outcomes of the course

LO1: Explain the fundamentals of orchestration using Kubernetes.

LO2: Migrate and deploy an application to Kubernetes.

LO3: Implement frameworks and cloud providers tied to Kubernetes.

1.4. Course content

The lectures are structured on two days.

Lecture 1:

- Orchestration

- Why Kubernetes is great for Orchestration?

- What makes Kubernetes a successful framework?

- How do you use Kubernetes and what are the good practises and pitfalls?

Lecture 2:

- What are Cloud providers and why theyr are a good fit with Kubernetes and orchestration?

- Presentation of some frameworks and tools which fit with Kubernetes?

- What are Microservices ? How to implement it and why Kubernetes is often associated with it?

The project consists of two parts. The first part is mandatory and the second part is a multitude of elements to add to the first part of the project. The students are free to take the tasks they are the most interested in.

1. Create a production ready kubernetes cluster. On this cluster, the students must deploy an application relying on a website (front), an API (backend) and a database.

   In addition to the application, the students must deploy a framework or a tool on the same cluster with Helm.

2. Optional tasks :

   o Connect your application with a continuous deployment.

   o Have a Dashboard solution or a monitoring solution.

   o Enable the developpers to access a staging environment with Role Based Access Control.

   o Set up a reverse proxy.

   o Write and deploy a custom operator.

1.5. Teaching delivery modes:	☒ lectures ☒ seminars and workshops ☐ exercises ☐ remote learning ☐ field work	☒ independent work ☐ multimedia and network ☐ laboratory ☒ mentoring ☐ other _____
1.6. Comments		The course material is taught interactively with a Q&A time. The teachers are available for questions during the project time.
1.7. Student obligations		

STUDENT ATTENDANCE
Class attendance is mandatory in the percentage prescribed by the Studies and examination regulations.

PASSING EXAM

Each groups of students must submit their results to the teachers and give an oral presentation based on their results. The results are reviewed by the academic staff during an oral examination. A justification of the project work can be explained by the students.

1.8. Monitoring[1] student work

Class attendance		Activity during class		Seminar paper		Experimental work	
Written exam		Oral exam	30 %	Essay		Research	
Project	70 %	Continuous assessment of knowledge		Student report		Practical work	
Portfolio							

1.9. Assessment and evaluation of student work during classes and the final exam

The students are assessed on the project results and on the presentation as well as the ability to explain their work.

The assessment is based on several criteria:

- Does the project contain all the elements required?
- Does the project work?
- Does the project is correctly connected?
- Is the content of the project qualitative?
    - Is the deployment production ready and following the industry standards?
    - Is the project maintainable and scalable?
- Are there any extra-elements added on the project?

The project evaluation is split in two parts; 30% of the grade is related to the presentation and the explanation and 70% related to the project achievements.

CONCRETE REVIEW OF EVALUATION METHODS

The maximum number of points that a student can earn in a course is 100. Grades are calculated according to the following criteria table within which the distribution of passing grades in terms of the number of points is applied.

Points	Grade
0,00 - 50,00	(E) unsatisfactory

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[1] IMPORTANT NOTES: Next to each method of monitoring student work it is necessary to insert an adequate share of each activity in ECTS credits, so the total number of ECTS credits corresponds to the credit value of the course. You can use empty fields for additional activities.

50,01 - 58,00	(D) sufficient
58,01 - 75,00	(C) good
75,01 - 92,00	(B) very good
92,01 - 100,00	(A) excellent

The method of accumulating points is determined in this course in accordance with the elements of scoring as follows:

Criterion	Maximum points
Project	70
Presentation	30
TOTAL	100

1.10.   Required reading (at the moment of submitting the joint study programme report)

1.11.   Additional reading (at the moment of submitting the joint study programme report)

The Kubernetes Authors. 'Kubernetes', 2020.
https://kubernetes.io/docs/concepts/overview/what-is-kubernetes/

The Kubernetes Authors. 'Kubernetes', 2020.
https://kubernetes.io/docs/tutorials/kubernetes-basics/

1.12.   Number of copies of required reading in relation to the number of students who currently attend a course

Title	*Number of copies*	*Number of students*

1.13. Methods of quality monitoring that ensure the acquisition of knowledge, skills and competencies.

The content of each modules is continuously revised to teach the students on the most up-to-date notions and concepts of IT. Indeed, the range of skills and knowledge in this sector is constantly getting broader, with a larger perspective of working in many different fields.

To ensure the quality of the teaching, a Steering Committee supervises the Quality Management System. The evolution of the teaching content is revised and validated by the Development Council. The teachers as well as the administration staff are evaluated by the students themselves. Finally, the teaching content is analysed and determined by evaluating the skills during the internships, by the partner companies.