UCLouvain

linfo2145

2026

Cloud Computing

5.00 credits	30.0 h + 15.0 h	Q1

Teacher(s)	Riviere Etienne ;
Language :	English > French-friendly
Place of the course	Louvain-la-Neuve
Prerequisites	Required#: principles of computer systems, as targeted in course LINFO1252 Desirable#: - skills in computer networks as targeted in course LINFO1341 - advanced notions of algorithms and data structures as targeted in course LINFO1121
Main themes	· Architectural principles of cloud computing · Scalability of cloud services (storage, computing, ...) · Building blocks for cloud services · Large scale computations in cloud environments · Programming models for cloud services · Providing scalable web services from the cloud
Learning outcomes	**At the end of this learning unit, the student is able to :** Given the learning outcomes of the "Master in Computer Science and Engineering" program, this course contributes to the development, acquisition and evaluation of the following learning outcomes: · INFO1.1-3 · INFO2.2-3, INFO2.5 · INFO5.2, INFO5.4-5 · INFO6.1, INFO6.4, INFO6.5 Given the learning outcomes of the "Master [120] in Computer Science" program, this course contributes to the development, acquisition and evaluation of the following learning outcomes: · SINF1.M1 · SINF2.2-3, SINF2.5 · SINF5.2, SINF5.4-5 · SINF6.1, SINF6.4, SINF6.5 Students having completed this course successfully will be able to · explain the goals, benefits and models of cloud computing, providing practical examples; · describe the main components of cloud computing; · design and conceive cloud services which operate reliably at scale; · explain how storage and virtualization are used in the cloud and apply this in practice; · apply the fundamental principles of multi-tier web applications and services in a cloud environment; · tackle big data computation problems (e.g., through the Map Reduce computing paradigm).

Evaluation methods	First session in January The final grade is computed as follows for the first session: · Final exam 60% · Project 40% Participation in the online quizzes and their peer review is not graded, but they are part of the teaching material and a good way to prepare for the exam. Second session in August It will not be possible to redo the project for the second session. The weights are: · Final exam 70% · Project 30% (carried over from first session) Evaluation modalities (exams, in both sessions) The exam may use all or a subset of the following evaluation modalities. The respective proportion of points for each part is announced at the beginning of the exam: · open questions on the course content; · open problems requiring an application of skills and knowledge acquired during the course and the project; · multiple-choice and multiple-answer questions under the principle of "standard-setting". An incorrect answer cannot lead to a negative grade, but a minimum threshold T (announced in the exam) of correct answers may be required before students can effectively start earning points for this part of the exam. The exam questions are in English. Students can answer them in English and/or French. Evaluation modalities (project) The project evaluation is based on three mandatory elements: · Delivery of a software repository with appropriate documentation and reproducibility material; · Delivery of a short report, including a self-assessment of the project's functionalities, with respect to a feature list; · A private technical presentation with one of the members of the course teaching staff, in which both students from the pair are expected to demonstrate their understanding of their project architecture and code and their ability to deploy it. The project is evaluated based on code quality and implemented features, subject to the persuasiveness of mastery and understanding of these two in the technical presentation. All provided project material is in English. The project code (comments), documentation, report, and technical presentation must be given in English. Any violation of deontological obligations (including but not limited to plagiarism, collaboration with students outside of the project group or with third parties, voluntary or involuntary sharing of code, e.g., via a public GitHub repository, etc.) will result in a grade of 0 for the project, and students will be denounced to the relevant authorities. Evaluation modalities (general information) The professor may request that a student take an additional oral exam in addition to the final exam and/or the project in cases including, but not limited to, technical issues or suspicion of irregularities. **Rules regarding the use of artificial intelligence (AI) for continuous assessment activities** **You may not use AI to answer quizzes or provide feedback during the peer evaluation phase** . This activity only has pedagogical value if students express their understanding of the course in their own words. The **use of AI for the project is not recommended** , as completing the project manually is the most effective way to acquire the skills targeted by the course. Its use is nevertheless **authorized** (whether to generate code or documentation), **subject to the following rules** : · Students must take **full responsibility for their work** and **be able to explain orally all the code and deliverables** (documentation, deployment scripts, etc.) submitted as part of the project. **Failure to explain any part of the deliverable during the oral exam will result in a failing grade** , regardless of the volume of code and features present in the deliverable. · **The use of AI must be precisely documented in the project documentation** , in a **dedicated AI statement** indicating which AIs were used and for which part. Submitting code or documentation generated partially or entirely by AI without documenting this use will be considered plagiarism. Students who did not use AI must also provide this statement. **Projects missing an AI statement, regardless of whether AI was used or not, will get a penalty of -5 points (out of 20).** · **Abusive use of AI** that undermines the acquisition of the knowledge targeted by the project may be considered an irregularity under Section 7, Articles 107 and following of the General Regulations for Studies and Exams (RGEE), with all the consequences that entail, as provided in Articles 111 and following. In the event of suspected abusive use of AI in the submitted project or an incomplete or inaccurate report of AI use, the course instructor may summon the student concerned for an additional oral consultation and take the necessary measures in consultation with the EPL jury chair.

Teaching methods	· Lectures · Scientific readings or/and videos from the industry · Quizzes (about readings, labs, and lectures) · Practical lab sessions (tutorials) · Project The quizzes are done individually. The project must be done in pairs
Content	This course covers modern cloud computing technologies and development principles. It covers systems aspects including virtualization, storage, and fault tolerance, as well as software engineering aspects such as building elastically scalable, service-oriented application backends. It explains modern data management and processing techniques and how to integrate them into cloud applications. The course also covers advanced topics and emerging technologies for secure, efficient cloud infrastructure. Core concepts and tools covered in class are gradually applied in a semester-long project in which students build, from the ground up, a cloud-native backend for a representative application.
Inline resources	Page Moodle (rechercher LINFO2145). Dépôt GitHub privé contenant tous les tutoriels et le matériel technique du projet.
Other infos	Required background: · LINFO1252 (or a similar undergraduate Operating Systems course) Recommended background: · LINFO1341 · LINFO1121 It is generally recommended to have a good grasp of networking, operating systems, and databases. The professor can recommend supplementary reading to help you catch up on these topics upon request.
Faculty or entity in charge	INFO

Programmes containing this learning unit (UE)

Program title	Acronym	Credits	Prerequisite	Learning outcomes
Master [120] in Computer Science and Engineering	INFO2M	5		
Master [120] in Computer Science	SINF2M	5		
Master [120] in Mathematical Engineering	MAP2M	5		
Master [120] in Data Science Engineering	DATE2M	5		
Master [120] in Data Science: Information Technology	DATI2M	5		