In view of the health context linked to the spread of the coronavirus, the methods of organisation and evaluation of the learning units could be adapted in different situations; these possible new methods have been - or will be - communicated by the teachers to the students.

<table>
<thead>
<tr>
<th>Teacher(s)</th>
<th>DeVille Yves ; Schaus Pierre ; Schaus Pierre (compensates DeVille Yves)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Language</td>
<td>English</td>
</tr>
<tr>
<td>Place of the course</td>
<td>Louvain-la-Neuve</td>
</tr>
</tbody>
</table>

### Main themes
- Constraints and domains
- Practical aspects of constraint solvers
- Constraint Satisfaction Problems (CSP)
- Models and languages for constraint programming
- Methods and techniques for constraint solving (consistency, relaxation, optimization, search, linear programming, global constraints, ...)
- Search techniques and strategies
- Problem modelling and resolution
- Applications to different problem classes (e.g. planning, scheduling, resource allocation, economics, robotics)

### Aims
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
- INFO2.2-4
- INFO5.4-5
- INFO6.1, INFO6.4

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.M4
- SINF2.2-4
- SINF5.4-5
- SINF6.1, SINF6.4

Students completing successfully this course will be able to:

- explain and apply techniques for solving Constraint Satisfaction Problems
- solve simple problems involving CSP
- explain foundations of models and languages for constraint solving
- identify problem classes where constraint programming can be applied successfully
- model simple problems in the form of constraints, and express these models in a constraint programming language, including search strategies.

Students will have developed skills and operational methodology. In particular, they have developed their ability to:

- master rapidly a new programming language;
- use technical documents to deepen their knowledge of a topic.

The contribution of this Teaching Unit to the development and command of the skills and learning outcomes of the programme(s) can be accessed at the end of this sheet, in the section entitled "Programmes/courses offering this Teaching Unit".

### Evaluation methods
Due to the COVID-19 crisis, the information in this section is particularly likely to change.

- Projects (50% of final grade)
- Written exam (50% of final grade)

Project and problem sets are mandatory during the semester of the course and cannot be repeated for the second examination session.
<table>
<thead>
<tr>
<th>Teaching methods</th>
<th>Due to the COVID-19 crisis, the information in this section is particularly likely to change. Lectures and practice sessions</th>
</tr>
</thead>
</table>
| Content                                | • Constraint Programming : a Declarative Programming paradigm  
• Architecture of a constraint programming solver  
• Global contraints and implementation techniques (incrementality, etc)  
• Search techniques and strategies  
• Combinatorial optimization problem modeling and solving  
• Applications to different problem classes (e.g. planification, scheduling, resource allocation, economics, robotics) |
| Inline resources                        | https://moodleucl.uclouvain.be/course/view.php?id=9158  
www.minicp.org |
| Bibliography                           | Le site www.minicp.org + lectures suggérées pendant le semestre |
| Other infos                            | Background  
• LINGI2261 : Artificial Intelligence |
<p>| Faculty or entity in charge            | INFO |</p>
<table>
<thead>
<tr>
<th>Program title</th>
<th>Acronym</th>
<th>Credits</th>
<th>Prerequisite</th>
<th>Aims</th>
</tr>
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<tbody>
<tr>
<td>Master [120] in Data Science Engineering</td>
<td>DATE2M</td>
<td>5</td>
<td></td>
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<tr>
<td>Master [120] in Computer Science and Engineering</td>
<td>INFO2M</td>
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<tr>
<td>Master [120] in Computer Science</td>
<td>SINF2M</td>
<td>5</td>
<td></td>
<td></td>
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<tr>
<td>Master [120] in Data Science: Information Technology</td>
<td>DATI2M</td>
<td>5</td>
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