UCLouvain

# lmapr2021

*2026*

# Societal challenges with polymers

| 5.00 credits | 30.0 h + 22.5 h | Q2 |
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**This biannual learning unit is not being organized in 2026-2027 !**

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| Teacher(s) | Glinel Karine ;Jonas Alain ;Van Ruymbeke Evelyne ; |
| Language : | English<br>> French-friendly |
| Place of the course | Louvain-la-Neuve |
| Prerequisites | The course requires basic knowledge of the physics and chemistry of polymers as given, for example, in the courses LMAPR2019 or LCHM1361. |
| Main themes | Physical and chemical properties of polymers, environmental and societal issues related to the use of polymers.<br>More specifically, specific themes will be addressed through a series of debates on cutting-edge topics related to polymers. These topics will be subject to change based on current events. For example, these debates could address the following issues:<br>• Bio-sourced polymer materials: a sustainable solution?<br>• Towards greater biodegradability of polymer materials: is this realistic?<br>• Micro-plastics and oceans: what to do?<br>• Management of multi-component materials: what are the solutions?<br>• Advantages and drawbacks of the use of nanoparticles in polymer materials<br>• Can we do without plastics in agriculture / electronics / packaging / telecommunications / etc.<br>• Plasticizers - to banish or tolerate?<br>• Plastic and use of fossil resources - an infernal couple?<br>• Life is based on macromolecules - why do not we? |
| Learning outcomes | **At the end of this learning unit, the student is able to :**<br>**Contribution of the course to the program objectives**<br>• **Axis 1: 1.1, 1.3:**<br>  • To be able to confront different complex and contradictory information, to analyze them critically, and to combine a series of tools, concepts, reasoning to respond in a judicious and well-argued way to the problem.<br>• **Axis 2: 2.3:**<br>  • Be able to analyze and take into account a set of different criteria (efficiency, quality, safety, carbon footprint, recyclability, alternatives, ...) to determine the relevance of a process.<br>• **Axis 3: 3.1, 3.3:**<br>  • Document and summarize the state of current knowledge in the field. Synthesize this research work to propose solutions or alternatives to the problem.<br>• **Axis 4: 4.1, 4.2, 4.3, 4.4:**<br>  • Collectively organize the preparation of debates, be able to defend ideas before other actors from different points of view, organize the work to produce a quality report / video.<br>• **Axis 5: 5.2, 5.4, 5.6:**<br>  • Argue and convince others, analyze and use technical documents.<br>• **Axis6: 6.2:**<br>  • Discuss the relevance of a solution by looking beyond technical issues. |
| Evaluation methods | Students will be continuously evaluated during the semester, through their presentations, active participation to the activities organized within the frame of the course, and final reportage. The three modules of the course will be graded for 5 points each; a final exam will be organized for the 5 final points of the grade.<br>The use of generative artifical intelligence is not forbidden for the preparation of the presentations, but it should be indicated to the teachers, done with criticism, and compared to other sources. Compliance with the general rules set forth by the EPL regarding the use of generative AI is required.<br><br>If, for one part of the continous evaluation process, a student does not abide to the methodological instructions defined on moodle by the teachers, including the use of online resources and student collaborations, all the continuous evaluation will obtain a grade of 0. |

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| Teaching methods | The course will be organized in three teaching modules. The first two modules are concerned with a general theme, for which the students will receive reference supports (scientific articles, press releases, videos and podcasts, reports, expert presentations, visits of industrial plants,...); from this, they will prepare a presentation that will be shared and discussed with the class. In the third module, the students will prepare an activity on the use of polymer materials for a specific range of applications, including a general view on this use, advantages and drawbacks of polymers for these applications, and possible solutions to the drawbacks. This activity may consist of podcasts, awareness actions directed towards specific publics, investigations, reportages, etc. |
| Content | After a general introduction to the polymer materials landscape, with the possible inputs of experts from the industry or NGOs active in the preservation of the nevironment, the course centers on two specific themes (see list above). Visits of industrial plants may be organized.<br><br>The course addresses the issue of polymer materials in a global and critical approach, taking into account eh challenges encountered by these materials in the face of the requirements of sustainable development and respect for the environment, as well as the interest of new approaches allowing these materials to enter into a virtuous circularity loop.<br><br>Thereby, the course focuses on the following axes of the program's skills framework of engineering studies at the master level:<br>1. "Rigorously mobilize scientific and technical skills and critical thinking to analyze complex situations by adopting a systemic and transdisciplinary approach,<br>2. and adapt technical responses to the current and future challenges of the socio-economic-ecological transition, thus actively contributing to the transformation of society." |
| Inline resources | The course material will be on Moodle. The course is based on different sources of information: book chapters, scientific articles, articles and press releases, online videos and podcasts, reports, ... |
| Faculty or entity in charge | FYKI |

| Programmes containing this learning unit (UE) | | | | |
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| Program title | Acronym | Credits | Prerequisite | Learning outcomes |
| Master [120] in Chemical and Materials Engineering | KIMA2M | 5 | | |