UCLouvain

# lchm2281

*2021*

# Photochemistry

| 3.00 credits | 22.5 h + 7.5 h | Q2 |
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| Teacher(s) | Elias Benjamin ; |
| Language : | English |
| Place of the course | Louvain-la-Neuve |
| Main themes | The main topics to be covered are :<br>- the interaction between light and molecules and the laws of absorption<br>- competitive kinetics and lifetimes which are controlling the course of photochemical reactions<br>- electron and energy transfer reactions<br>- basics of radiative emission processes, mainly fluorescence and its use as a tool to elucidate reaction mechanisms. |
| Learning outcomes | **At the end of this learning unit, the student is able to :**<br>1 This course aims to afford the students with the basic principles of excited state generation under UV and visible irradiation. Viewed in the perspective of a physical organic chemistry course, it should allow the student to reasonably evaluate the reactivity of an excited state and to analyse its monomolecular fate (photophysics) as well as its bimolecular interactions. The student will be able, using the principles given in the course, to optimize a reaction in the laboratory. |
| Evaluation methods | **The final exam** covers the course content. It takes the form of **an oral exam with prior written preparation**. |
| Teaching methods | The teaching takes place in person.<br>However, it is possible that some sessions will be held remotely depending on the schedule of the speakers. |
| Content | The basic principles of absorption and the production of excited sates are considered following a kinetic and theoretical approach. Lifetime and decay of the excited states are also considered. The absorption and emission intensity factors are examined as well as the multiplicity of states. The photophysics, that is to say the evolution of excited states without considering reaction partners are then considered: possible decay (radiative or non radiative) of the energetic excess and Jablonski diagrammes. The intermolecular processes are then considered: excimeres, exciplexes and extinction of excited states through energy transfer reactions, electron or proton transfer reactions, and use of these processes in sensitization. The Marcus theory is also presented. The use of fluorescence, the Stern-Volmer approach as well as basics of fluorescence quantum yield are explained in view of helping to elucidate mechanisms. These mechanisms are considered in the light of the theory of orbital symmetry conservation. The final part of the course describes several organic photoreactions and some important applications of photochemistry in technological domains. |
| Inline resources | Essential course materials are available on the Moodle platform:<br>• Slides presented in the course |
| Bibliography | Livre de référence disponible à la BST : N. Turro, Modern Molecular Photochemistry, University Science Book.<br>------<br>Reference book available at BST: N. Turro, Modern Molecular Photochemistry, University Science Book. |
| Faculty or entity in charge | CHIM |

## Programmes containing this learning unit (UE)

| Program title | Acronym | Credits | Prerequisite | Learning outcomes |
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| Master [120] in Chemistry | CHIM2M | 3 | | 🔍 |