



**ADMISSION TO DOCTORAL STUDIES**

**Session September 2023**

**Field of doctoral studies: Materials engineering**

**Doctoral supervisor: Prof. dr. chem. Cătălin Croitoru**

**TOPICS FOR THE ADMISSION TO DOCTORAL STUDIES**

**TOPIC 1:** *Multifunctional polymeric matrix composite materials incorporating natural additives and auxiliaries*

**Content / Main aspects to be considered**

- Obtaining polymeric and composite materials
- Characterizing the morphology, structure, composition, and interaction between the components of the polymeric or composite system.
- Evaluating the criteria for the application areas of the obtained materials.

**Recommended bibliography:**

1. Rahman, R. (editor). *Advances in Sustainable Polymer Composites*. Elsevier Science, 2020. ISBN: 978-0-12-820342-2.
2. Sabu, T.; Kuruvilla, J; Malhotra, K.; Goda, K.; Sreekala, M.S (editors). *Polymer Composites, Biocomposites*. Wiley, 2013. ISBN: 978-3-527-67424-4.
3. Inamuddin, N. (editor). *Green Polymer Composites Technology*. CRC Press, 2016. ISBN: 978-1-31-535400-2.

**Prerequisites / Remarks:** *studies in engineering, chemistry, physics*

**TOPIC 2:** *Functional hydrogel materials based on synthetic polymers and biopolymers*

**Content / Main aspects to be considered**

- Obtaining of chemical/physical crosslinked hydrogels from synthetic and/or natural polymers for environmental depollution applications (adsorbent materials for organic compounds and heavy metal ions from wastewaters), sensoristics and controlled release of active ingredients;
- Characterization of the morphology, structure, composition and interaction between the components of the hydrogel system.

**Recommended bibliography:**

1. Ninago, M.D.; López, O.V.; Horst, M.F. *The Applications of Hydrogels*. 2021, ISBN: 978-1-68507-219-3.
2. Thakur, V.K.; Thakur, M.K (editori). *Hydrogels: Recent Advances*. Springer, 2018. ISBN: 978-981-10-6077-9.
3. Haider, S.; Haider, A. (editori) *Hydrogels*. IntechOpen, 2018. ISBN: 978-1-78923-368-1.

4. Chu, Y. Hydrogels Based on Natural Polymers. Elsevier, 2020. ISBN: 978-0-12-816421-1.  
Oliveira Monteiro da Silva Abreu, F. Physical Hydrogels for Drug Delivery Applications: Physical Hydrogels. Eliva Press, 2022. ISBN: 978-1-63648-153-1.

**Prerequisites / Remarks:** *studies in engineering, chemistry, physics or pharmacy*

**TOPIC 3:** *Development of multifunctional thin films using the sol-gel technique*

**Content / Main aspects to be considered**

- Development and optimization of precursor formulations for obtaining thin films using sol-gel technique
- Characterization of the functional coatings obtained through sol-gel technique (morpho-structural, etc.) and recommendation for different applications.

**Recommended bibliography:**

1. Klein, C.L. (editor). Sol-Gel Technology for Thin Films, Fibers, Preforms, Electronics and Specialty Shapes, Elsevier Science, 1988. ISBN: 978-0-815-51154-0.
2. Chandra, U (editor). Recent Applications in Sol-Gel Synthesis. IntechOpen, 2017. ISBN: 978-9-535-13245-5.
3. Attia, Y.A. (editor). Sol-Gel Processing and Applications. Springer, 2012. ISBN: 978-1-461-52570-7.

**Prerequisites / Remarks:** *studies in engineering, chemistry, physics*

**Doctoral supervisor,**

Assoc. Prof. dr. chem. Cătălin Croitoru

**Coordinator of the field of doctoral studies,**

Prof. Dr. Eng. Mircea Horia Țierean

