



**Course Syllabus**

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| <b>Department/Faculty</b><br>School of Engineering   |
| <b>Graduate Program</b><br>Materials Engineering and Nanotechnology  |
| <b>Degree</b><br><input checked="" type="checkbox"/> Academic Master's <input checked="" type="checkbox"/> Doctorate (PhD) <input type="checkbox"/> Professional Master's  |
| <b>Course Name</b><br>Artificial Intelligence applied in Nanotechnology  |
| <b>Professor(s)*</b>   |
| <b>Office hours</b><br>48  |
| <b>Course Overview</b><br>Introduction to the process involving the use of artificial intelligence in data science applications (collection, processing, and analysis); Introduction to learning paradigms with an emphasis on bioinspired models; Introduction to the main neural architectures; Applications of artificial intelligence focusing on nanotechnology problems such as forecasting, optimization, and data clustering; Introduction to the basic concepts of nanotechnology; Introduction to surface effects; Introduction to nanomaterial-based sensors.   |
| <b>Topics outline</b> <ul style="list-style-type: none"><li>• 1. Artificial Intelligence<ul style="list-style-type: none"><li>• a. Data collection, storage, and analysis process</li><li>• b. Machine learning paradigms</li><li>• c. Neural network architectures</li><li>• d. Modeling problems involving forecasting, optimization, and clustering</li></ul></li><li>• 2. Nanotechnology<ul style="list-style-type: none"><li>• a. Characteristic scales and lengths</li><li>• b. Fundamentals and basic concepts</li></ul></li><li>• 3. Nanosensors<ul style="list-style-type: none"><li>• a. Introduction to sensors</li><li>• b. Surface effects</li><li>• c. Sensors based on different nanomaterials.</li></ul></li></ul> |
| <b>Letter Grade Assignment</b><br>Grade A (Excellent) - Grade points between 9 and 10<br>Grade B (Good) - Grade points between 8 and 8.9<br>Grade C (Satisfactory) - Grade points between 7 and 7.9<br>Grade D (Unsatisfactory) - Grade points between 0 and 6.9   |



**Texts, Materials, and supplies**

KHANNA, V. K., Nanosensors: Physical, Chemical, and Biological. CRC Press, 2012.  
LIM, TEIK-CHENG, Nanosensors, Theory and Applications in Industry, Healthcare and Defense. CRC Press, 2011

REZENDE, S. M. Materiais e Dispositivos Eletrônicos, 4a Edição, Editora Livraria da Física, 2015.

SERWAY, R. A e JEWETT, J. W. Princípios de Física Vol 4 ótica e física moderna. 5a Edição, Cengage Learning 2014.

FERREIRA, M. Nanoestruturas – Princípios e Aplicações. Elsevier Editora Ltda. 2015

HAYKIN, S. Neural networks and learning machines, Bookman; 3a. edição, 2008

SILVA, L. A; PERES, S. M.; BOSCARIOLI, C. Introdução à mineração de dados: com aplicações em R. Gen LTC, 2016.

DE CASTRO, L. N. and FERRARI, D. G. Introdução a mineração de dados: Conceitos básicos, algoritmos e aplicações. Saraiva, 2016.