Code: **QI855**

Name: **Fundamentos e Aplicações de Materiais Luminescentes**

Name in English : **Fundamentals and Applications of Luminescent Materials**

Name is Spanish: **Fundamentos y Aplicaciones de Materiales Luminiscentes**

Subject type: **Weekly**

Approval type: **Grade and frequency**

Characteristic: **Regular**

Frequency: **75%**

Period Type / Offering period: **Semestral / All periods**

Requires Final Exam: **Yes**

Vectors

T	L	P	O	PE	OE	SL	WEEKS	CREDITS
2	**-**	**-**	**-**	**-**	**-**	**2**	**15**	**2**

Occurrence on curriculum:

Pre requirement: **QI345 or QI346**

Summary: Fundamentals about excitation and emission mechanisms, selection rules of electronic transitions, radiative and non-radiative mechanisms, return to ground state, energy transfer mechanisms; downshifting, dowconversion and upcoversion processes and applications.

Program

- Electronic Configuration and energy levels of free ions;
- Spectroscopy and molecular terms;
- Selection Rules of electronic transitions;
- Ligand field and symmetry influences on energy leves and selections rules;
- Emission and absorption band intensities of intraconfiguratinal (nd-nd; 4f-4f) transitions and charge tranfer transitions
- Antenae Effect
- Radiative mechanisms: downshifting, downconversion and upconversion
- Non-ratiactive (quenching) and energy trasnfer mechanisms
- Emission Lifetime
- Emission quantum yelds: Absolute and relative
- Instrumentation
- Biomedical and technological applications

Basic Bibliography

1) SIGOLI, F.A., BISPO Jr, A.G., SOUSA FILHO, P.C. **Lantanídeos: química, luminescência e aplicações**. Editora Átomo, 2022. 420p.

2) BLASSE, G., GRABMAIER, B. C. **Luminescent materials**. Berlin: Springer-Verlag, 1994.232p.

3) LAKOVICKS J.R., **Principles of fluorescence spectroscopy**, 3nd ed., Springer, New York, 1999. 954p.

Supplementary Bibliography

1) BUNZLI, J. C. G.; CHOPPIN, G.R. **Lanthanides probes in life: medical and environmental science, Amsterdan; Elsevier**, 1989. Cap. 7. Pgs 219 a 293

2) KITAI, A. H., **Luminescent materials and applications - Wiley Series in Materials for Electronic & Optoelectronic Applications**, 2008. 272p.

3) HUHEEY, J. E., KEITER, E. A., KEITER, R. L., **Inorganic Chemistry: Principles of Structure and Reactivity**. 4th ed.: Harper Collins, 1993. 964p.

4) McQUARRIE, D.A. AND SIMON, J. D. **Physical Chemistry: A Molecular Approach**, 1st. ed, University Science Books, 1997. 1255p.

5) COTTON, F. A., WIKINSON G., **Advanced Inorganic Chemistry**, 5. ed, John Wiley, 1998. 1411p