



**UNIVERSIDADE FEDERAL DE SANTA CATARINA
CENTRO DE CIÊNCIAS FÍSICAS E MATEMÁTICAS
PÓS-GRADUAÇÃO EM MATEMÁTICA PURA E APLICADA**

MTM510027 Spectral Methods

Pre-requisite: MTM410028 Numerical Analysis I

Weekly lesson hours: 06h

Discipline syllabus: Fourier-Spectral and Chebyshev-spectral methods. Schemes of projection and interpolation. Theory of polynomial approximation. Theory of stability and convergence. Spectral methods for initial value and boundary problems. Computational Aspects.

BIBLIOGRAPHIC REFERENCES

Text book:

1. CANUTO, C., HUSSAINI, M. Y., QUARTERONI, A. & ZANG, T. A., Spectral Methods in Fluid Dynamics, Springer-Verlag (1988).
2. CLAUDIO G CANUTO, M. YOUSUFF HUSSAINI, ALFIO QUARTERONI AND THOMAS A. ZANG, Spectral Methods; Fundamentals in Single Domains, Springer-Verlag (2010)
3. ROGER PEYRET, Spectral methods for incompressible fluid flow, Springer (2010).

COMPLEMENTARY BIBLIOGRAPHY

1. FUNARO, D., Polynomial Approximation of Differential Equations, Springer-Verlag, Heidelberg (1992).
2. FUNARO, D., Spectral Elements for Transport-Dominated Equations, Springer-Verlag (1997).
3. GUO BEN-YU, Spectral Methods and their Applications, World Scientific (1998)
4. KOPRIVA, D. A., Implementing Spectral Methods for Partial Differential Equations Algorithms for Scientists and Engineers, Springer (2009).
5. FORNBERG, B., A Practical Guide to Pseudospectral Methods, CUP, Cambridge (1966).
6. TREFETHEN, L. N., Spectral Methods in MATLAB, SIAM (2000).
7. BOYD, J. P., Chebyshev and Fourier Spectral Methods, 2nd ed., Dover (2000).
8. GOTTLIEB, D. & ORSZAG, S. A. Numerical Analysis of Spectral Methods: Theory and Applications, SIAM (1987).