280801 - Advanced Mathematics for Ship and Ocean Engineering

Coordinating unit: 280 - FNB - Barcelona School of Nautical Studies
Teaching unit: 749 - MAT - Department of Mathematics
Academic year: 2017
Degree: MASTER'S DEGREE IN NAVAL AND OCEAN ENGINEERING (Syllabus 2017). (Teaching unit Compulsory)
ECTS credits: 5
Teaching languages: Catalan, Spanish

Teaching staff
Coordinator: MARIA ÁNGELA GRAU GOTÉS

Degree competences to which the subject contributes

Basic:
1. That the students can apply their knowledge and ability to solve problems in new or unfamiliar environments within broader (or multidisciplinary) contexts related to their study area.
2. That students can communicate their conclusions and the knowledge and latest rationale underpinning to specialists and non-specialty clearly and unambiguously.
3. Students must possess the learning skills that enable them to continue studying in a way that will be largely self-directed or autonomous.

Transversal:
4. EFFECTIVE USE OF INFORMATION RESOURCES: Manage the acquisition, structuring, analysis and visualization of data and information in the field of specialty, and critically evaluate the results of this management.

Learning objectives of the subject

Ability to solve complex mathematical problems and their application to the resolution of naval engineering problems.
Knowledge of existing numerical tools to solve these problems.

Study load

| Total learning time: 45h | Hours large group: | 45h | 100.00% |
# Content

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<th>Topic</th>
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| **Root finding and nonlinear sets of equations** | 21h | Theory classes: 10h 30m  
Guided activities: 1h 30m  
Self study : 9h |
| **Description:** | | Iterative methods for nonlinear equations: Newton method and fixed point methods. Order of the convergence and efficiency of a method.  
Iterative methods for systems of nonlinear equations: Newton method and fixed point methods. |
| **Numerical approximation of functions** | 30h | Theory classes: 10h 30m  
Guided activities: 1h 30m  
Self study : 15h |
| **Numerical methods for partial and differential equations** | 39h | Theory classes: 18h  
Guided activities: 3h  
Self study : 18h |
| **Analysis of the dynamics of systems in the frequency domain** | 5h | Theory classes: 3h  
Self study : 2h |
| **Description:** | | Fourier analysis. Wavelet transform and fast Fourier transform. Analysis of the dynamics of systems in the frequency domain. |
Bibliography

Basic:


Complementary:


Others resources:

Hyperlink

https://es.mathworks.com/matlabcentral/fileexchange/

Versions of classic algorithms worked in the classroom