Numerical Differential Equations
Syllabus (Fall Semester, 2015)
Graduate School, Ewha Womans University

Course Number : MA 506	Class Hour : Wed 2/3 (9:30-12:15)
Hours and Credits : 3 hr 3 cr	Office Hour : Wed/Fri (2:00-2:45)
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1. Main text book

Michael Celia(MIT/Princeton) and William Gray(Notre Dame), **Numerical methods for differential equations**, fundamental concepts for scientific and engineering applications. Prentice Hall. [PDE+FDM/FEM]

2. References

Robert Schilling and Sandra Harris(Clarkson), **Applied numerical methods for engineers (using Matlab and C),** Brooks/Cole, 2000. [Basic Numerical Tools]

John Strikwerda(Wisconsin), **Finite Difference schemes and PDEs,** Wadsworth & Brooks / Core, 1989. [Finite difference method]

Charles Hall and Thomas Porsching(Pittsburgh), **Numerical Analysis of PDEs,** Prentice Hall, 1990. [Finite element method / Analysis]

Tikhonov and Samarskii, **Eqs of Mathematical physics,** Dover, 1963(1990) [PDE]

Sobolev, **PDEs of Mathematical physics**, Dover, 1964(1989) [PDE]

3. Homeworks and Evaluation Scheme

- **Homework or Computational Project** : 4-5 times (40%)
- **Final Examination** : Theory and basic idea methods (60%)

4. Weekly Syllabus

주	강 의 주 제	강 의 제 목	교재 페이지	비 고
1-3	Partial differential equation	1.1 Physical systems 1.2 Defs and Eqs Properties 1.3 Characteristics and BC	1-43	8/31(M)
4-6	Finite difference approximation (one-dimensional FDM)	2.1 Discrete approximations 2.3 Analysis of approximation 2.4 Generalized Formulation 2.6 Initial Value Problems	44-90	9/26-29(M)
7-8	Finite difference approximation (Multi-dimensional FDM)	2.7 Multi-dimensional problems 2.8 Two dimensional examples	91-108	
9	Midterm Exam Week	-	-	10/23-27(M)
10-12	Finite Element approximation (Theoretical basis)	3.1 Weighted residuals 3.3 Computation Procedures 3.4 Mathematical requirements	114-165	
13-14	Finite Element approximation (Computational Methods)	3.5~3.6 Method of weighted residuals in 2D/3Ds 3.7 Galerkin Finite Element method	166-177	
15	Miscellaneous Topics	4.3 Space-Time Discretization	242-254	
16	Final Exam Week	Final (Written) Exam	-	**12/14(M)** 12/15-17(W)