

## Advanced Computational Science

2 units (selection)

Toshiki Takeuchi · PROFESSOR / PLANNING AND DESIGN SYSTEMS ENGINEERING FOR INFRASTRUCTURES, CIVIL AND ENVIRONMENTAL ENGINEERING, INTELLIGENT STRUCTURES AND MECHANICS SYSTEMS ENGINEERING

**Target** This class provides the basic technology for numerical calculation for the differential equation.

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(Office Hour: 木曜日 14:00-15:00)

**Outline** The numerical calculation methods for the differential equation are introduced.

**Style** Lecture

**Keyword** *numerical analysis, numerical computation, differential equation*

**Fundamental Lecture** “Numerical Analysis”(1.0), “Basic Mathematics/微分積分学 I”(1.0), “Basic Mathematics/微分積分学 II”(1.0)

**Relational Lecture** “Methods for analysis of mathematical phenomena”(1.0), “Numerical Analysis”(1.0)

**Requirement** Students have to understand basic mathematics of undergraduate-level.

**Goal** To understand principle of numerical calculation methods.

**Schedule**

1. Introduction to numerical simulation
2. Mathematical model
3. Lagrange interpolation
4. Spline interpolation
5. Least squares method
6. Finite difference method
7. Arbitrary precision formula
8. Application to ordinary differential equation
9. Application to partial differential equation
10. Gauss-Seidel method
11. Successive Over-Relaxation method
12. Explicit method
13. Implicit method
14. Crank-Nicolson method
15. Numerical instabilities

**Evaluation Criteria** Assignments count 100%

**Contents** <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=216625>

**Student** Able to be taken by only specified class(es)

**Contact**