Tentative Course Schedule

References: The instructor's handwritten lecture notes [YW] is mainly but not entirely based on Professor Hans De Sterck's course notes [HS], a copy of the latter is made available on Learn for your reference. Whenever two texts differ, please be sure to follow [YW] as assignments and exams are designed based on [YW].

Grayed-out textbooks are recommended readings from which some sections in [YW] are inspired. Note that [YW] is self-contained so studying these texts is completely optional. They are included for interested readers and for proper attribution.

[YW] **Greg's in-class handwritten lecture notes.**

[HS] H. De Sterck. Introduction to Computational Mathematics. Course Notes for AMATH 242 / CS 371.

[KA] K. E. Atkinson. An Introduction to Numerical Analysis. Second Edition. 1987.

[NH] N. J. Higham. Accuracy and Stability of Numerical Algorithms. Second Edition. 2002.

[AI] A. Iserles. A First Course in the Numerical Analysis of Differential Equations. Second Edition. 2009.

[WB] W. L. Briggs and V. E. Henson. The DFT, An Owner's Manual for the Discrete Fourier Transform. 1995.

[LT] L. N. Trefethen and D. Bau, III. Numerical Linear Algebra. 1997.

Schedule table: The unchecked part of the following table is provisional and subject to change as the term progresses.

Lectures	Dates	Topics	Attribution	Progress
Week01 - Lec01	MY 06, M	• Floating Point Systems I	[NH] Ch.2	✓
Week01 - Lec02	MY 08, W	• Floating Point Systems II		✓
Week02 - Lec03	MY 13, M	• Single Precision Format • Floating Point Arithmetic	[HS] Ch.1	✓
Week02 - TUT	MY 15, W	• MATLAB/Python tutorial		✓
Week03 - Lec04	MY 22, W	• Cancellation Error • Conditioning of a Mathematical Problem • Stability of a Numerical Algorithm	[HS] Ch.1	
Week04 - Lec05	MY 27, M	• Intro of Root Finding • Four Root Finding Algorithms	[HS] Ch.2	
Week04 - Lec06	MY 29, W	• Convergence of Root Finding Algorithms	[HS] Ch.2, [KA] Ch.2	
Assignment I (Lec 1-5), due date: 11:59pm, May 31st, Friday.				
Week05 - Lec07	JN 03, M	• Intro of Numerical Linear Algebra • LU Factorization & Gaussian Elimination I	[HS] Ch.3, [LT] Lec.20	
Week05 - Lec08	JN 05, W	• LU Factorization & Gaussian Elimination II	[HS] Ch.3, [LT] Lec.20	
Week06 - Lec09	JN 10, M	• LU Factorization & Gaussian Elimination III • Conditioning of $A\vec{x} = \vec{b}$ I	[HS] Ch.3, [LT] Lecs. 4, 20	
Week06 - Lec10	JN 12, W	• Conditioning of $A\vec{x} = \vec{b}$ II • Stability of Gaussian Elimination I	[HS] Ch.3, [LT] Lec.4 [HS] Ch.3, [LT] Lec.22	
Assignment II (Lec 6-9), due date: 11:59pm, June 14th, Friday.				
Week07 - Lec11	JN 17, M	• Stability of Gaussian Elimination II • Iterative Methods for Solving $A\vec{x} = \vec{b}$ I	[HS] Ch.3, [LT] Lecs. 22,32	
Week07 - Lec12	JN 19, W	• Iterative Methods for Solving $A\vec{x} = \vec{b}$ II • Convergence of Iterative Methods I	[HS] Ch.3, [LT] Lec. 32	
Week08 - Lec13	JN 24, M	• Convergence of Iterative Methods II • Polynomial Interpolation (Lagrange form)	[HS] Ch.3, [LT] Lec. 32 [HS] Ch.5, [KA] Ch.3	
Midterm Exam: STC 1012, 6pm-8pm, June 24th, Monday.				
Week08 - Lec14	JN 26, W	• Polynomial Interpolation (Hermite form) • Runge Phenomenon & Piecewise Poly. Interp.	[HS] Ch.5, [KA] Ch.3	

Week09 - Lec15	JL 03, W	• Spline Interpolation • Polynomial Interpolation (Newton form)	[HS] Ch.5, [KA] Ch.3	
Week10 - Lec16	JL 08, M	• Error Estimate of Polynomial Interpolation • Numerical Integration I - Midpoint Rule	[HS] Ch.5, [KA] Ch.3 [HS] Ch.6, [KA] Ch.5	
Week10 - Lec17	JL 10, W	• Num. Int. I - Trap. and Simpson's Rules • Num. Int. II - Composite Rules	[HS] Ch.6, [KA] Ch.5	
Assignment III (Lec 10-15), due date: 11:59pm, July 12th, Friday.				
Week11 - Lec18	JL 15, M	• Num. Int. III - Gaussian Quadrature • Intro of Complex Plane and Fourier Series	[HS] Ch.6, [KA] Ch.5 [HS] Ch.4, [WB] Ch.2	
Week11 - Lec19	JL 17, W	• Real and Complex Forms of Fourier Series	[HS] Ch.4, [WB] Ch.2	
Week12 - Lec20	JL 22, M	• Discrete Fourier Transform I	[HS] Ch.4, [WB] Ch.2	
Week12 - Lec21	JL 24, W	• Discrete Fourier Transform II	[HS] Ch.4, [WB] Ch.2	
Assignment IV (Lec 16-21), due date: 11:59pm, July 26th, Friday.				
Week13 - Lec22	JL 29, M	• Fast Fourier Transform	[HS] Ch.4, [WB] Ch.2	
Final Exam: To be announced.				