Uncertainty Quantification in Physical and Biological Applications

Course Introduction

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MATH 728 - Spring 2025
University of South Carolina
Department of Mathematics

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South Carolina

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  - I highly recommend using Latex or Word for typesetting; I will provide .tex files of the homework PDF for your use.

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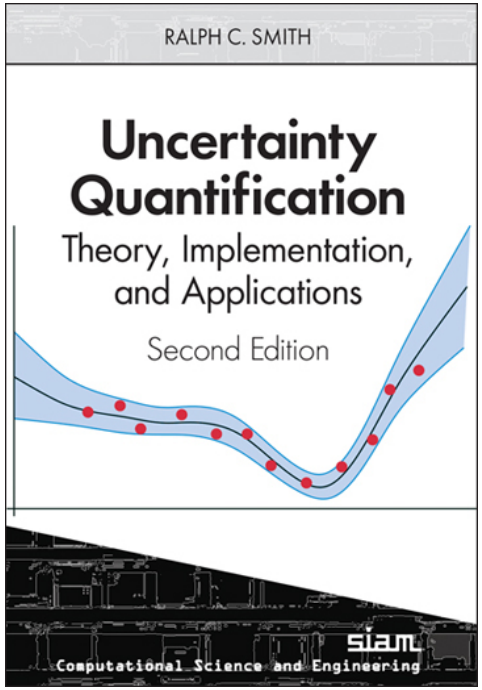
- My hope is that the final project contributes to an Aim or paper in your graduate studies, so please think about how you may use this class in your research !

The book



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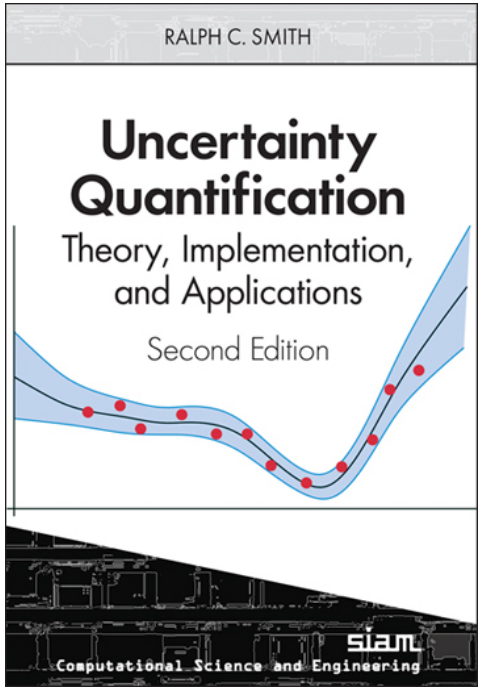

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- It is not required, but it is highly recommended (especially if you plan on using or conducting research in UQ).

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Outline of semester

1. Applications and examples (0.5 weeks ; chapters 2 and 3)
2. Fundamentals of probability, random processes, and statistics (1.5 weeks ; chapters 4 and 6)
3. Representation of random inputs (1 week ; chapter 5)
4. Parameter selection techniques, sensitivity analyses, active subspaces (3 weeks ; chapters 7-10)
5. Frequentist and Bayesian model calibration (3 weeks ; chapters 11-12)
6. Uncertainty propagation (2 weeks ; chapter 13)
7. Model discrepancy (1 week ; chapter 14)
8. Surrogate/reduced order modeling (2.5 weeks ; chapters 15-19)
9. Sparse grids (0.5 weeks (if time allows) chapter 20)

Questions

Any questions about class content ?

Introductions

Lets take 5-10 minutes to introduce ourselves!