

DS 288 (3:0) Numerical Methods/  
UE 201 (3:0) Introduction to Scientific Computing

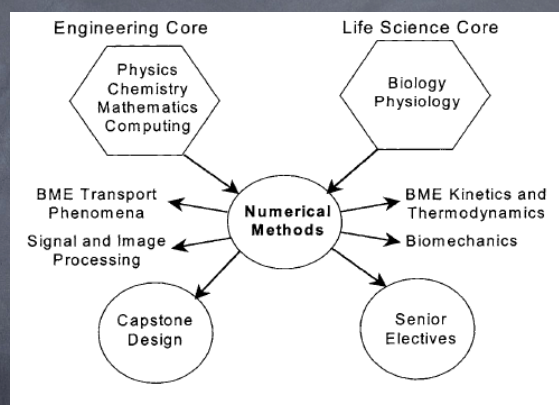
# Introduction

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August 17, 2021

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# Introduction

## Numerical Methods -Applications



Ref: Dunn

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# Introduction

Numerical Methods/Analysis

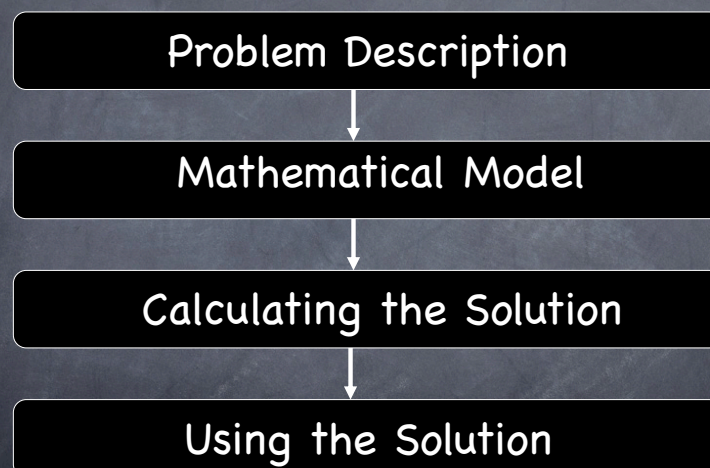
Methods: Formulation/Approximation

Analysis: Follows Methods (error/stability)

DS 288 (3:0): Numerical **Methods**

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How do we model a Scientific problem?

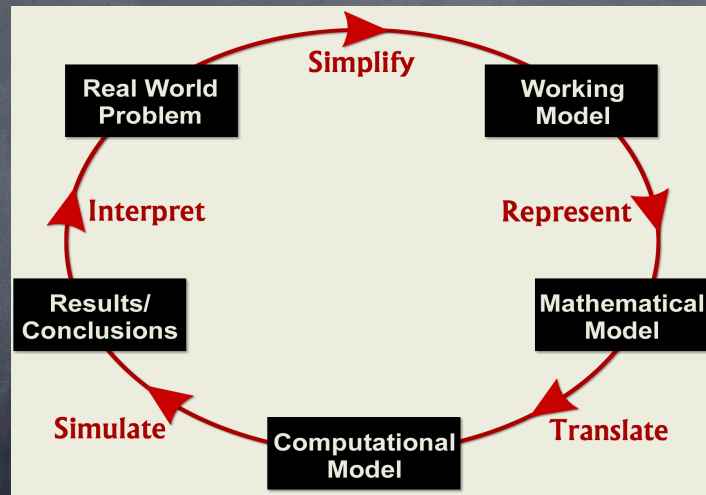


<http://numericalmethods.eng.usf.edu>

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# Scientific Computing Process

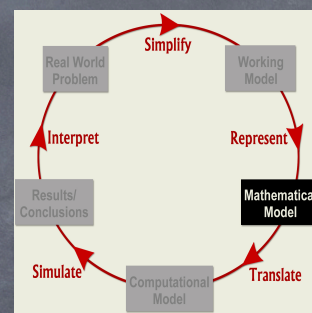


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## Mathematical Model

*Represent → Mathematical Model:* Express the *Working Model* in mathematical terms; write down mathematical equations or an algorithm whose solution describes the *Working Model*.

*In general, the success of a mathematical model depends on how easy it is to use and how accurately it predicts.*

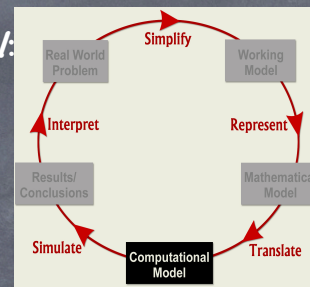


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# Computational Model

**Translate → Computational Model:**  
Change *Mathematical Model* into a form suitable for computational solution.

Computational models include languages, such as Python, C++ or Java, or software, such as Matlab or Mathematica.



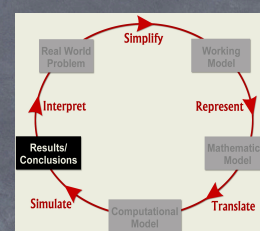
R. Allen, AIS Challenge, STI 2004 Presentation

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# Results/Conclusions

**Simulate → Results/Conclusions:**  
Run "Computational Model" to obtain *Results*; draw *Conclusions*.

- Verify your computer program; use check cases; explore ranges of validity.
- Graphs, charts, and other visualization tools are useful in summarizing results and drawing conclusions.



R. Allen, AIS Challenge, STI 2004 Presentation

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# Introduction

## DS 288: Numerical Methods

Credits: 3:0 3 hours of Lectures

**Grading:** Homeworks: 50%  
Midterm Exam: 25%; Final Exam: 25%.

**[ABSOLUTE GRADING]**

Course Teams Link:

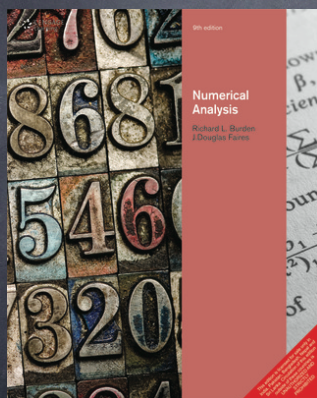
[https://teams.microsoft.com/l/team/19%3acEvS\\_GzJ5\\_kamfdszJJBTNZ4xejbwK6sQGmXRc9Nw81%40thread\\_facy2/conversations?groupId=809bdad6-1080-450d-9d9c-6fedadad6f02&tenantId=6f15cd97-f6a7-41e3-b2c5-ad4193976476](https://teams.microsoft.com/l/team/19%3acEvS_GzJ5_kamfdszJJBTNZ4xejbwK6sQGmXRc9Nw81%40thread_facy2/conversations?groupId=809bdad6-1080-450d-9d9c-6fedadad6f02&tenantId=6f15cd97-f6a7-41e3-b2c5-ad4193976476)

Bookmark it and regularly monitor the Teams Page  
- Google form filling is compulsory

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# Introduction

## DS 288: Numerical Methods



Main Reference text book:

1. Richard L. Burden and J. Douglas Faires, "Numerical Analysis," Ninth Edition, Cengage Learning Publishers, 2011.

<https://www.cengage.com/higher-education/science-mathematics/mathematics/numerical-analysis-numerical-analysis-cp>

(additional text books will be used based on the topic and content)




Computing Packages: MATLAB/Octave

Links for MATLAB Tutorials are posted on the teams

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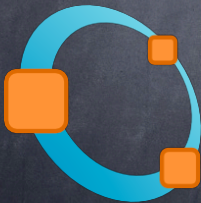
# Computing Packages



DS 288: Numerical **Methods**

MATLAB TAH Model: (free for IISc students)

<http://www.serc.iisc.ac.in/software/matlab-tah-model-total-academic-headcount-license-tah/>



Octave: <http://www.gnu.org/software/octave/>

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# Introduction

DS 288: Numerical **Methods**

Class Timings:  
7:00 AM – 8:30 AM  
Tuesday and Thursday

Office Hours: Friday 3:30 PM to 5:30 PM  
(or by appointment)

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## Important Polices

- You are registered for a professional degree, behave like professionals.
- No late home work submission is allowed.
- Honor the honor principle (if found copying, you shall fail the class)
- Have to meet the instructor for grading of homework solutions. Should be able to explain your work.
- Meet the instructor in the office hours alone.
- All announcements will be posted on the teams page, it is your responsibility to check it.
- No need to ask for permission to enter or leave the classroom, you can join in and out any time during the class.
- Please switch off your mobile phone and mute your mic, while joining the online classroom

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## Important Notes

- You should fill up a google form posted on the Teams page for class registration (deadline Aug 23, 2021 7 AM)
- Get started on Matlab (if you are new to programming)
- Look at the files posted under information folder

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A dark blue, textured background resembling a chalkboard or a piece of heavy paper with visible grain and some lighter, irregular patches.

# Thank you

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