

MAT 305: Mathematical Computing

Introduction to Mathematical Computing

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University of Southern Mississippi

Spring 2019

Outline

- 1 What this class is about
- 2 Computer programming
- 3 Basic class information
- 4 Words I shouldn't have to say
- 5 Summary

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Description

Introduction to symbolic mathematical problem solving using computer based systems.

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- *introduction*: there is a huge world beyond this
- *symbolic*: as opposed to *numeric*
 - difference discussed later

Problem solving or programming?

- This class is about mathematics
 - Problem solving
 - Introduce ideas of higher mathematics: matrix properties, modular arithmetic
- Some problems best attacked with a computer
 - Long
 - Experimentation
 - Repetitive/tedious
- Computers require instructions, called **programs**
- We study *some* programming, *but* this is not a programming class

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Why program?

- Control over computer
- Deeper understanding of computer technology

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- Computers don't understand human languages
 - Humans intuitive, poetic; computers literal, mechanical
 - Computers only understand **on** or **off** (“machine code”)

Why program?

- Control over computer
- Deeper understanding of computer technology
- Computers don't understand human languages
 - Humans intuitive, poetic; computers literal, mechanical
 - Computers only understand **on** or **off** (“machine code”)
- (Most) humans don't understand a computer's native language
 - Mathematics literal and precise, but (most) humans don't understand it, either!
 - Even the humans that do, prefer not to talk to the computer in that language

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Class webpage

Everything you need on the **class webpage**

- syllabus
- homework assignments
- link to the textbook (online, and free!)
- link to the computer algebra system we'll use
- reference of useful \LaTeX commands
 - what is \LaTeX ? you'll learn!
- lecture notes
- sample worksheets
- maybe even test solutions!

Let's talk about the syllabus

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① visit the website

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- 5 I did it in Sage
- 6 you can learn to do that, too
 - (honest! I'm *not* that smart)

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Yes, this is a “Dr. Perry” class

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Student comments, Fall 2016:

If a student went to his office hours for help, he would often tell students to look over something again but not take the time to explain what he meant or what was said in the book. Sometimes he would explain what he meant but those were few and far between. I would not recommend anyone taking a class from him.

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(guess which one was written by a math major)

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“High” expectations

- read the text
- do the assigned work
- don't cheat
- ask questions... but not “dumb” questions

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 - turn off phone, log off Facebook
 - **pay attention**

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- A question you could answer yourself in 5 seconds

What is not a dumb question?

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Most questions!

- “Can you make the screen text bigger?”
- “Can you go back to the previous slide?”
- “Can I get a hint on this problem?”
- “What you typed isn't working for me. Can you check what I have?”
- “What does this error mean?”
- “Why isn't my program working?”
- “Will you be in your office today?”
- “What's your website again?”

On the other hand...

The following comments help no one

- “I don’t understand.”
- “This is complicated.”
- “My program isn’t working.”
- “Other classes don’t have to work so hard!”

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Common misconceptions

- “I can’t do this.”
- “I’ll never learn.”
- “Programming’s not for me.”

Has cheating been a problem?

Yes

MAT 305

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- at least one Honors student involved
- at least one degree denied
- half of 2016 class was dishonest in one way or another

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I am not afraid to use it.

You have been warned.

“What, me cheat?”

Definitely cheating:

- using someone else's solution to the same problem
- pretty much any online search
 - looking up a solution to a similar problem online
 - adapting an online solution to a similar problem
 - **do not use online help sites**

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Definitely *not* cheating:

- asking the professor for help
 - I will help you, though it may not be fun
- reading the book
 - adapting a book/class program to a similar problem
- discussing program design/implementation with others
 - just don't *copy* or have them tell you what to type

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- Class on *mathematical* problem solving with *computers*
- Some programming involved, but that is not the purpose
- Uses programming via Sage