

## Information on the course

Federico Poloni — federico.poloni@unipi.it. Room 343 DN.  
Teacher for the linear algebra part.

- ▶ Speaking hours: Friday 11 (after the lecture). Different times can be arranged on request.

**Warning:** some weeks I may be out of Pisa (for instance, conferences), especially outside of the teaching season. Always best if you inquire by e-mail (with reasonable advance).

# Content

You have already seen an introduction to the course.

**Remark:** it's not the old NMO course; changes in content/scope.

I will deal with the numerical linear algebra part.

**Books** (for this part)

- ▶ Trefethen–Bau, *Numerical linear algebra*. **Recommended** — we will follow more its approach.
- ▶ Demmel, *Applied numerical linear algebra*. Alternative source — for other exercises, for instance.

# Matlab

Matlab: a language for matrix computations — with a big Visual Basic-like IDE.

Clunky language with great libraries and syntactic sugar for numerics (as opposed to, for instance, Python or C++: great languages with some numerics stapled onto them).

(Show example)

# How to install Matlab

Available without charge to Unipi students: info on <http://matlab.sid.unipi.it>.

## TL;DR

- ▶ Create an account on [www.mathworks.com](http://www.mathworks.com) with your `@studenti.unipi.it` e-mail;
- ▶ Add the 'activation key' found on [http://doc.sid.unipi.it/images/1/15/Istruzioni\\_Installazione\\_MatLab\\_Student\\_2017.pdf](http://doc.sid.unipi.it/images/1/15/Istruzioni_Installazione_MatLab_Student_2017.pdf);
- ▶ Download and install.

Suggested to save disk space and/or bandwidth: install only a few 'toolboxes'. In this course we'll use Matlab, Symbolic Toolbox, Optimization Toolbox. You may want also Statistics and Machine Learning Toolbox, Neural Network Toolbox.

# Matlab introduction

## Command window

```
>> a = 19
```

```
a =
```

```
    19
```

```
>> b = 5
```

```
b =
```

```
     5
```

```
>> a+b
```

```
ans =
```

```
    24
```

```
>> c = 2*a + b; % semicolons suppress output
```

## Accuracy of operations

Default data type: double.

**Warning:** operations are only accurate 'up to 16 digits'.

```
>> (1/98) * 98 - 1  
ans =  
-1.1102e-16
```

(exponential notation: stands for  $-1.1102 \times 10^{-16}$ )

Understanding these approximations will be an important feature.