Project lectures

ENG-270

Objectives for turning in code (generally)

- Other people can verify your results as quickly as possible
- Build off your project (reuse part of your code for another project)
- Meeting either objective requires similar level of effort in communicating your implementation clearly

Topics to be covered

Workflow

- version control and collaboration through git
- data and code organization (project directory structure, modules)
- automation 1: including C/MATLAB(/Python) integration
- automation 2: shell scripting and string processing
- visual representation of results
- documenting code, citing prior art

What will be provided

- report template
- repository template (for organizing code)

Objective for lectures

- Rapid overview of a broad range of relevant topics
- Provide exposure to possibilities for further exploration
- Point to resources for independent learning
- Learn good practices and discrimination of “code quality”

Schedule

Week	Wednesday	Friday	Language	Exercise	Concepts	Assessment
1	10.09.2025	12.09.2025	MATLAB	Eolienne	Data types and control flow, IDE, I/O	
2	17.09.2025	19.09.2025	MATLAB	CO2	System of equations, Optimization	
3	24.09.2025	26.09.2025	MATLAB	virus inactivation	Optimization	
4	01.10.2025	03.10.2025	MATLAB	tropospheric O3 trends	Data models and data analysis	
5	08.10.2025	10.10.2025	C	CFC photolysis	Numerical integration / differentiation	
6	15.10.2025	17.10.2025	C	des, parite, etoiles, lac	Random numbers, loops, functions	Project proposal
7	22.10.2025	24.10.2025		**Fall break**		
8	29.10.2025	31.10.2025	C	cryptographie, seismes, GPS	Pointers, characters/strings, arrays, struct	
9	05.11.2025	07.11.2025	C	terrain, transport	2D arrays, simulation	Feedback on project proposal
10	12.11.2025	14.11.2025		Project	Version control, automation	
11	19.11.2025	21.11.2025		Project	automation, documenting code	
12	26.11.2025	28.11.2025		Project	visualization, citing prior art	
13	03.12.2025	05.12.2025		Project		
14	10.12.2025	12.12.2025		Project		
15	17.12.2025	19.12.2025		Project		Project report
	Exam period					Final exam

Period	Description
Wednesdays 13h15-14h	GCC330 lecture or independent work
Wednesdays 14h-15h	CO021 with assistants
Wednesdays 15h-16h	CO021 with assistants
Fridays 10h15-11h	CO021 lecture or independent work
Fridays 11h-13h	CO021 with assistants

Also use Ed Discussion

General feedback on project proposals

Project proposal

Contents:

1. Question to be answered / motivation for the project (why would anyone care that you undertake this project)
2. Current "state-of-the-art" (what is the closest computer program/code you are aware of or that you can find)
3. Objective and scope of the project
4. Approach (methods/data set you plan to use) - is it feasible?
5. Expected schedule and apportionment of labor among team members - either a weekly Gantt chart or table of anticipated milestones

Assessment criteria:

- Clear motivation, introduction of the topic, and definition of project scope
- Attempt at identification of model (and data set, if applicable), including classification (continuum/discrete, empirical/mechanistic, forward/inverse)
- Attempt at identification of related computer programs/codes
- Statement of feasibility (also as reflected in Gantt chart)

1. Question to be answered / motivation
    - why would anyone be interested in this topic: curiosity, societal implications, technological development
2. Current state-of-the-art:
    - what is the closest study you can find related to or similar to your topic (what do we know about the topic)
    - is there a computer code available for it. e.g.:
        - there is code available but it is for a more complex model
        - there is code available but it is in a different language
        - there is code available but you will implement it differently
        - there is a description of model and results but no code
    - is there a computer code in a related domain
3. Objective and scope:
    - what processes will you include / exclude
    - what scenarios will you consider

"scenarios" → parameter values

4. Approach:
    - what is the model equation - is it mechanistic or empirical (e.g., conservation equation, or a parametrized relationship between input and output)
    - will you be using the model for forecasting/prediction problem or inference (e.g., want to understand model parameters)
5. Expected schedule - items to include, feasibility
    - collection of data for evaluating model parameters, results
    - how will I evaluate whether model is working properly?
    - elements of project: (data I/O, creation of scenarios, simulation/computation, analysis of results, report writing)