# Software Engineering

Prof. Maged Elaasar

# Know Your Instructor

**Professor** Maged Elaasar

**PhD** in Electrical and Computer Engineering, Carleton University ‘12
**MSc** in Computer Science, Carleton University ‘03
**BSc** in Computer Science, American University in Cairo ‘96
**Research**: software engineering / systems engineering
**Publications**: 75+ peer-reviewed articles, 12 US patents, 5 standards

**Industry:** Senior Computer Scientist, NASA JPL @ Caltech
**Academia**: CS Lecturer (UCLA and Northeastern University)

Carleton University
The American University in Cairo
UCLA
Northeastern University
Jet Propulsion Laboratory
California Institute of Technology

# Dr. Elaasar's Software Engineering Career

- NASA/Caltech, JPL ('14 - now)
  - Lead of **openCAESAR** platform (https://opencaesar.io/)
  - Lead of Integrated Model Centric Engineering (**IMCE**) project
  - Lead of Autonomica R&D project
- Modelware Solutions ('10 - now)
  - Consultant to CEA-LIST, Simula Labs, Ford, BAE Systems, etc.
- Object Management Group ('08 - now)
  - Chair of the **UML** standard
  - Contributor to the **SysML** standard
- Rational Software, IBM ('00-'14)
  - Architect of **Design Management** (web app)
  - Architect of **Rational Software Architect** (desktop app)
  - Developer of **Rational Rose Realtime** (desktop app)
- Corel Corporation ('97-'00)
  - Develop of **Corel Draw** (desktop app)

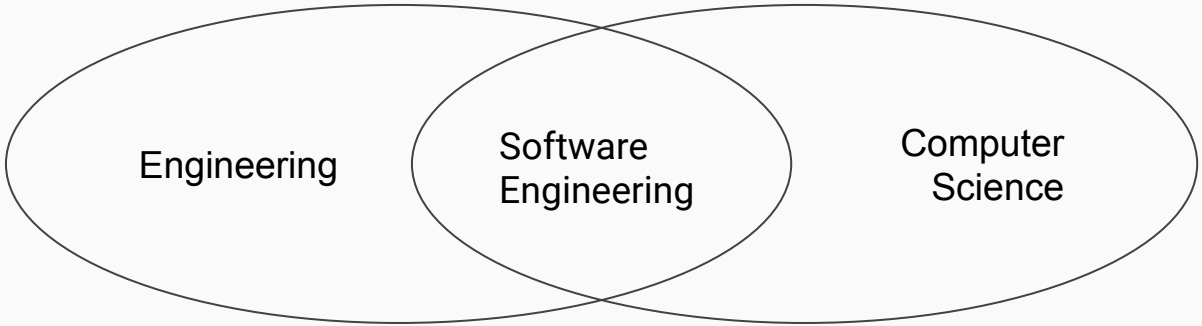




# Software Engineering: a Definition

“Software engineering is the application of a systematic, disciplined, quantifiable approach to the development, operation, and maintenance of software; that is, the application of engineering to software”

-IEEE



# Lecture

- Teaches **processes, methods, and best practices** that can be used throughout the different phases of the software development lifecycle.
- Includes a **open-source project**, in which you will develop a significant software application in a team and apply the skills you learned in class.
- **Does not** teach programming languages or transient technologies; however, Java and some technologies will be used to explain ideas.

# Lecture Topics

- Software Process (different ones but will focus on the Scrum process)
- Software Analysis (with different UML diagrams)
- Software Architecture (different architectural patterns)
- Software Design (different Gang of Four design patterns)
- Software DevOps (continuous integration, delivery, and monitoring)
- Software Code Generation (abstraction and automation)
- Software Testing (black/whitebox, unit, regression, symbolic execution)
- Software Review (hoare logic)
- Software Evolution & Maintenance (anti-patterns, refactoring)

# Textbook

- We will NOT use a particular textbook in this course
- Instead, we will prescribe reading from various online resources

# Project

- The project will be run by a team of 5 people
- You will develop an open-source (web, mobile, desktop) application
- You can choose your own project idea and technology stack
- You will show your progress by 4 deliverables
  - Part A: Concept
  - Part B: Design
  - Part C: Implementation
  - Part D: Presentation/Demo
- Grade will not be the same for every one as individual contribution and peer review feedback will be taken into account
  - Formula will be **Group Grade** for A+B+C+D - **Individual Penalty**

# Actions Before Next Class

- Submit the Academic Integrity assignment (**IMPORTANT**)
- Submit the Background Survey assignment
- Sign up to the class on Piazza
- Get into a project team
  - Submit Project Part A assignment
  - Setup a Github Repo and share link with your TA
- Read about first lecture:
  - Software Process Models: https://www.scnsoft.com/blog/software-development-models
  - Scrum Process: https://www.scrum.org/resources/what-is-scrum
  - Agile at Spotify 1 :https://www.youtube.com/watch?v=Yvfz4HGtoPc
  - Agile at Spotify 2: https://www.youtube.com/watch?v=vOt4BbWLWQw