| MONTCLAIR STATE UNIVERSITY | **Department of Computer Science**

Fall 2013 | |

CMPT 484:   Foundations of Programming Languages

General information
Meeting Times and places: Mondays 1:00 – 2:15 pm RI 376 / virtual meeting 1:15 hrs each week
Instructor: Dr. Stefan A. Robila
Office: 312 Richardson Hall
Phone: (973) 655-4230
Email: robilas@mail.montclair.edu
Skype: montclair.state.robila
Office Hours: Monday 2:15-3:15pm, 4:15-5:15pm Wednesday 10:30-11:30pm or by appointment
                 Every effort is made during the office hours to have skype connection available.

Purpose of the course
Syntax and semantics of modern programming languages with emphasis on programming in the large, functional, logic, and object-oriented paradigms. Common threads found in both imperative and non-imperative languages discussed.

Motivation
In 1977 the United States Department of Defense (DoD) started a competition to design a new programming language. The aim was to replace the hundreds of programming languages in use within the DoD, Army, Air Force, Navy, NASA, and defense contractors with a single programming language with the intent of saving millions of dollars used to support all the languages in use. The DoD explored the reason why so many languages were in use, and the domains in which they were being used. This identified the design criteria for the design competition.

The winning design was named Ada in honor of Ada Augusta Lovelace, the first programmer. Ada is as a general-purpose, structured, strongly-typed programming language with support for both the imperative and object-oriented paradigms. It has explicit support for concurrency and non-determinism, as well as real-time and embedded systems. It was successfully used in mission-critical software in a broad range of domains including air traffic control, and avionics including the fly-by-wire system software of the Boeing 777. Several certified, validated compilers were produced; these compilers were assured to implement the programming language as defined by the international standard.

Ada was adopted for use by the US DoD and by several of the foreign equivalents to the US DoD amongst ally countries, including Australia and the United Kingdom. Soon after the design competition and the availability of certified, validated compilers, the US DoD mandated the use of Ada in all projects it funded, This mandate was effectively removed in 1997 when the DoD began to embrace Commercial-Off-The-Shelf (COTS) systems. By their nature, COTS solutions are produced by third-parties and may be written in any language!

Why did the DoD seemingly reverse its decision to use a single language to save millions of dollars? Why did so many programming languages exist? What do all of these languages have to offer us? Why is one programming language not the answer?

In this course we will examine a number of programming paradigms and come to understand their contributions. This will help us express our ideas and improve our background in choosing a programming language as an appropriate tool to solve a problem. It will improve our ability to learn new languages based on a solid understanding of each programming paradigm, and offer us better understanding of the significance of programming language implementation. We will also understand the evolution and advancement of computing based on the contributions of all these programming languages.

Instructional Objectives
At the end of the course, you should be able to:
- Evaluate programming paradigms and languages,
- Identify and apply a programming paradigm and relevant language constructs to solve a problem,
- Compare and contrast programming languages and paradigms

Prerequisites
Knowledge of a high level language is a must. Programming knowledge of data structures is essential. Some of the examples and assignments will require programming implementations (preferably in Java). Basic understanding of computer organization is also assumed.

Class Materials
Textbook (required):
Robert W. Sebesta, "Concepts of Programming Languages", 10th edition, Addison Wesley, 2012, ISBN-10: 0131395319
ISBN-13: 978-0131395312.
The textbook is available through the MSU bookstore although it is possible that better pricing may be obtained through third party vendors..
There is also plenty of other information sources that will help you understand better the course. A list of them is provided by the author on the publisher website.
Additional links will be provided and maintained on **Blackboard**. Feel free to email me additions to it.
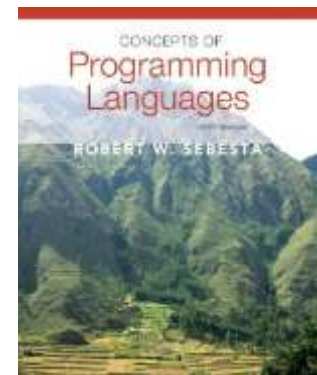
Class Structure
This course is a hybrid one. It meets once every week for 1h15 minutes and then provides you with additional learning activities. The class format will be a sequence of lectures, presentations and discussions. The virtual activities require you to read and learn concepts and come prepared to the class.. The class includes examinations, and homework assignments. All materials will be made available online on **Blackboard**.

Evaluation

Homework (35%): Several homework assignments will be provided. They will cover the topics presented during the lectures and will include practical problems (requiring implementation). The assignments are to be solved individually by each student. The due date and time will be indicated each

time the homework is assigned and will be strictly enforced (late submission means no submission). I do not intend to provide any individual extensions of the deadlines. All submitted homework must be provided in printed format (unless allowed by the instructor). Handwritten assignments will not be accepted. It is possible that parts of the homework to take the shape of a project.

Written Examination (40%): There will be one in class midterm examination and one in class final examination (20% each). The midterm examination date is tentatively set (see schedule). Any change will be announced at least two full weeks ahead. The final examination is already scheduled by the university on December 16 at 3:15 pm.

Project (25%) See separate document for general project description

Grading

No curve will be used in assigning the grades. Instead, here is how the grades will be determined:

Total	850-1000	700-849	550-699	500-549	499<
Grade	**A**	**B**	**C**	**D**	**F**

The splits between plus and minus grades varies depending on the actual distribution of the final averages. However, if your average is 925 or more, you are assured of A.

Important notes

Accomodations

Students with disabilities are protected by Section 504 of the Rehabilitation Act of 1973 and the Americans with Disabilities Act of 1990. According to these laws, "no otherwise qualified person with a disability shall, solely by reason of disability, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity of any public entity." Reasonable accommodations are available for students with a documented disability. If you have a disability and may need accommodations to fully participate in this class, please visit the Disability Resource Center (DRC). All accommodations must be approved through the DRC (Webster Hall, Room 100, ext. 5431).

Academic Honesty

"*Academic dishonesty is any attempt by a student to submit 1) work completed by another person without proper citation or 2) to give improper aid to another student in the completion of an assignment, such as plagiarism. No student may intentionally or knowingly give or receive aid on any test or examination, or on any academic exercise, that requires independent work. This includes, but is not limited to using technology (i.e., instant messaging, text messaging, or using a camera phone) or any other unauthorized materials of any sort, or giving or receiving aid on a test or examination without the express permission of the instructor.*" (Montclair State University Student Code of Conduct II.A. – as revised in August 2012).

Cheating and plagiarism will not be tolerated. Copying work from other students, presenting work not done by you as your own, or otherwise misrepresenting your work will result in penalties including a failing grade for the respective task. University regulations related to this topic will be strictly enforced. For full regulations on this, please consult the MSU Code of Conduct.

Homework assignments and examinations are intended to be solved individually. It should be pointed out that in case of duplicate submissions, all the students involved would be penalized in equal

measure. Allowing other people to copy your solutions is considered academic dishonesty. Group work for the term paper/project is allowed only through agreement with the instructor.

Attendance

Attendance is mandatory. Only one unexcused absences are allowed, and in this case it is your responsibility to obtain information on any classroom activity that you may have missed. A second absence will result in the lowering of your grade (for example from an A- to a B+). If you have more than four unexcused absences you will fail the course. Excused absences include illness (a doctor's note is needed) or a serious personal crisis (a letter from the Dean of students is required). Travel time is not an excused absence. Sporting events are not excused absences.

Participation in the virtual class discussion, access and completion of the online tasks are proof of your virtual attendance. Please note that the online material access are tracked and logged to ensure that you did participate. Failure to participate will result in a lower grade in the assignments.

You are expected to take the examinations at the times that will be indicated. Missing an exam or test creates a very difficult situation for all parties involved. As such make-up for missed tests will be administered under extreme circumstances. The attendance policy applies to a missed test. A missed test will be considered an unexcused absence.

The Computer Science departmental policy for incomplete grades goes as follows:
"A grade of incomplete may be assigned only under the following circumstances:
1. The student has completed at least 12 weeks of the course
2. The student has a passing grade in the course
3. The student has a serious reason (e.g., a medical condition) to miss the rest of the work.

Incomplete contracts should call for the student to complete the work as soon as reasonably possible".

How to succeed in this class:

Please note that this class requires a constant amount of work. Each week a new book chapter will be considered. You are required to read this chapter in advance and to solve as many problems as possible from the end of the chapter. The class requires certain programming knowledge. If you have not programmed for some time, you <u>must use the first week to catch up with it</u>. Note that a CS lab is available in RI 105 for your use. If you have some free time while at school, plan to spend it there. Please read carefully any instructions and make sure you understand what you have to do before working on a task and submitting it for grading.

- Take advantage of the posted materials to save effort in taking notes.
- If you don't understand something get help *early*.
- Start work on assignments/homeworks *early*.
- Come to office hours prepared with *specific* questions.
- Be honest with yourself and study at home
- <u>Start work on assignments/homeworks *early*.</u>

How to communicate with the instructor outside the class time:

- Stop in at during the posted office hours.
- Email with the subject line starting with **CMPT 484**.
  - *Messages with subjects different than this may take longer to answer. Messages sent during the weekdays will most probably be replied to in the same day. Messages sent on Friday afternoon until Monday morning will be answered on Monday morning.*
- Call the office phone number.
  - *Leaving a message may not result in a quick answer as I am not checking the voicemail too often.*