Description

COMS/SE 342: Principles of Programming Languages. *Prereq: Minimum of C- in COM S 228 and MATH 165; COM S 230 or CPR E 310 Study of concepts in programming languages, especially functional programming concepts. Overview of major programming paradigms, their relationship, and tradeoffs among paradigms enabling sound choices of programming language for application-specific development. Programming projects.*

Instructor and Teaching Assistants

- Instructor: Samik Basu (sbasu@), office hrs: T, 3:30-5:30PM.

- Teaching Assistants: Michael Dixon (medixon@), office hrs: MTRF 12-2:00PM, Olukorede Joseph Fakorede (fakorede@), Office hrs: MTRF 9-11AM.

- Recitations will be conducted by Michael Dixon. Recitation hours will be used as Q/A sessions. Students attending the recitation sessions are expected to join in with specific questions related to the lecture-topics and/or assignments.

- Canvas will be used for all assignments release and student-submission; Piazza for all discussions/information.

Syllabus/Outline[1]

1. Introduction, History, Background

2. Computation Models and Imperative, Declarative paradigms

3. Introduction to Functional paradigm: λ-calculus

4. Language syntax: Context Free Grammar

5. Language semantics: Denotational, Axiomatic, Operational

6. Tool for Functional Programming: DrRacket/Scheme https://racket-lang.org/

7. Basic Language Features and comparison between languages (imperative vs. functional)

    (a) Control constructs
    (b) Variables and scopes
    (c) References
    (d) Functions

8. Introduction to logical languages: Propositional and first-order logic.

9. Tool for Logic programming: SWI-Prolog http://www.swi-prolog.org/

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[1]Topics and their ordering may change during the semester

10. Computing with Logic

    (a) Rule-based programming

    (b) Unification

    (c) Backtracking

    (d) Cuts

Outcomes

Understand programming language features in different paradigms.

1. Knowledge of and ability to program in functional and/or logical paradigms

2. Ability to write interpreters for programming languages

3. Computing ABET Outcomes

    (a) Ability to analyze complex computing problem and to apply principles of computing and other relevant disciplines to identify solutions.

4. Engineering ABET Outcomes

    (a) Ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.

Course Work & Grading

Percentage points: tentative

1. 6-8 Homework assignments (including written and programming tasks): 50%. All homework assignments must be submitted electronically via Canvas. The format for submission will be specified as part of the homework assignment. **Assignments may be due during the dead-week**.

2. 2 Midterms (Tentative timline: Last week of February and First week of April): 30%

3. 1 Final: 20%

 Grade levels

    > 90: A-, A
    > 75: B-, B, B+
    > 60: C-, C, C+
    > 45: D-, D, D+

Student Academic Accommodation Request

Iowa State University is committed to assuring that all educational activities are free from discrimination and harassment based on disability status. All students requesting accommodations are required to meet with staff in Student Disability Resources (SDR) to establish eligibility. A Student Academic Accommodation Request (SAAR) form will be provided to eligible students. The provision of reasonable accommodations in this course will be arranged after timely delivery of the SAAR form to the instructor. Students are encouraged to deliver completed SAAR forms as early in the semester as possible. SDR, a unit in the Dean of Students Office, is located in room 1076, Student Services Building or online at www.dso.iastate.edu/dr/. Contact SDR by e-mail at disabilityresources@iastate.edu or by phone at 515-294-7220 for additional information.

Policy for Academic Dishonesty

You are encouraged to discuss course materials with classmates and organize group study sessions. Studying together and explaining each other concepts and materials discussed in class and recitations often help in improving the understanding of the topics and enhance the learning experience. However, each of you must work separately on your assignments (homework assignments and exams). For instance, the following (non-exhaustive) activities are strictly prohibited:

1. Writing solutions together

2. Copying from another student

3. Sharing part of or whole solutions (e.g., posting, emailing, printing and handing over)

4. Posting course assignments on the Web and asking for solutions [2]

In short, apply common sense and when in doubt, ask the instructor and TAs to ascertain that your activities are not prohibited.

In an unfortunate event that we suspect academic misconduct, the case will pursued in accordance to ISU policies (http://catalog.iastate.edu/academic_conduct/#academicdishonestytext). Anyone found responsible for academic misconduct may receive a failing grade **F** in the course.

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[2]You may re-use materials that are already publicly available from the Internet with appropriate acknowledgment (cite the source).