# Syllabus 2020 FALL CS 470/570 Programming Languages

# **CRN : 50622 CS 470-002**

# **CRN : 50626 CS 570-001**

# General Information

# Contact Your Instructor

**Name:** R.B.Abhyankar

**Email:** R.B.Abhyankar@indstate.edu

**Office:** Root Hall, A-182

## Lecture, Exam, Office Hours

Lecture: 11:00 a.m. to 11:50 a.m. MWF, RO-A019 (for face-to-face sections)

**Exam:** Please look up the Final Exam date and time at the Registrar’s Web Site:

**Instructor Office Hours:** 8:00 a.m. to 9:00 a.m. MWF

via land line telephone: 812-299-5177

Also by appointment.

**Website**: There is no course web site, but there is material on Blackboard.

## Prerequisites

A grade of C or better in CS 201, or consent of instructor.See <http://cs.indstate.edu/info/courses.php>

A 500 level course cannot be taken as part of the MS program if you have completed the same 400 level course at ISU. For example, if you completed CS 470 as an undergrad, you **cannot** take CS 570 as an MS student and count it towards the degree.

## Recommended and/or Required Text

Online Resources are given below.

[1] Learn Prolog Now

http://www.learnprolognow.org/

[2] Learn You a Haskell for Great Good

http://learnyouahaskell.com/

[3] Squeak Smalltalk

<https://squeak.org/>

[4] The Little Book of Semaphores

<http://greenteapress.com/semaphores/LittleBookOfSemaphores.pdf>

[5] Syntax and Semantics of Programming Languages

http://homepage.divms.uiowa.edu/~slonnegr/plf/Book/

Textbooks:

[1]    "OCaml from the Very Beginning" by John Whittington

               (Coherent Press, 2013, ISBN-13: 978-0-9576711-0-2)

[2]    "More OCaml " by John Whittington

               (Coherent Press, 2014, ISBN-13: 978-0-9576711-1-9)

## Course Announcements

Announcements regarding the course will be made both during class and via email to your @sycamores.indstate.edu email address. You should regularly check this email account or have it forwarded to an account that you check regularly.

## Classroom conduct

You may not use cell phones, iPods/music players, etc. during class. You should be civil and respectful to both the instructor and your classmates, and you should arrive to class a few minutes before the scheduled lecture so you are ready for lecture to begin on time. You may use your computer during class if you are using it to follow along with the examples that are being discussed. You may not check email, facebook, work on other courses, etc. during class.

# Course Description

The official description of this course from the catalog is :

The purpose of the course is to develop an understanding of the organization of programming languages and introduce the formal study of programming language specification and analysis. Topics covered usually include: language definition structure, data types and structures, control structures and data flow, run-time consideration, interpretative languages, lexical analysis, and parsing.

# Course Outline

Prolog and Logic Programming Paradigm (4 weeks), Haskell and Functional Programming Paradigm (3 weeks), Smalltalk and Object Oriented Paradigm (2 weeks), Concurrent Programming Paradigm (1 week), Syntax and Semantics of Programming Languages (2 weeks), Introduction to Ocaml(3 weeks)

Normal Content

The course begins with a history of programming languages, and the various programming paradigms are introduced. The Logic Programming paradigm is covered using Prolog as the example. Backtracking, unification, recursion, the cut , depth first search are covered. Stack overflows, occurs check , and floundering problems are covered. Applications covered are list processing, state space problem solving, constraint processing, expert systems, natural language processing and parsing.

The Functional Programming paradigm is illustrated using Haskell. Covered are list processing and the conversion to tail recursion using the method of accumulating parameters, fixed point computation, square root computation and sorting, testing of perfect numbers, and implementing the Sieve or Eratosthenes using Lazy Evaluation, available in Haskell. Proofs of list properties using structural induction are covered, and the implementation of data structures using Haskell is covered.

The Object Oriented Programming paradigm is covered using Smalltalk: introduced are the elements of the GUI: browsers, Workspaces, and Transcripts, Defining classes, and objects, inheritance and aggregation hierarchies are introduced. Avoidance of conditional code through polymorphism, polymorphism within and across inheritance hierarchies is considered, and the model –view – controller pattern through the use of the dependency mechanism are described. The issue of aggregation vs. inheritance is discussed via a concrete example.

The Concurrent Programming paradigm is introduced. Three synchronization problems are considered: Serialization, Mutual Exclusion and the Rendezvous. Semaphores are introduced and the use of Semaphores in solving the synchronization problems are discussed. Implementations of the solutions are given in Smalltalk, using the Process and Semaphore implementations available in Smalltalk.

Aspects of the syntax and semantics of programming languages are covered. A multi-paradigm language, Ocaml , is introduced.

# Learning Outcomes

After completing the course the student should be able to write programs using the logic, functional, object-oriented and concurrent programming paradigms.

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# Expected Amount of Work

If you take this class seriously and get what you should out of it, some weeks you will likely be spending around 4 **hours/week** or more on the class. The students who get A’s in their CS courses and have an easy time finding jobs do spend this much time on this course. Not everyone would need to spend this much time and not all weeks will be the same, but you should plan on putting in whatever time it takes.

# Grading and Assignments

The students of this course have the following responsibilities: read assigned readings before lecture, attend lecture, complete homework assignments, take in-class quizzes, take exams, and complete a project.

DISTRIBUTION OF POINTS

Quizzes: 10 %

Assignments: 70 %

Final Exam: 20 %

## CS Course Policies

Note that this course follows all standard CS course policies. In particular check the CS course policies related to - cheating/plagiarism, attendance, missing exams. See <http://cs.indstate.edu/info/policies.html> for details.

## Late Homeworks

Assignments submitted late may not earn full credit due.

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## Start Homeworks Early

We suggest attempting a homework assignment the day it is given, or the day after, so that if you have a problem you can ask early. If you continue to have problems in trying to complete the assignment, you will have time to ask again. Many of the homework assignments require thought and problem solving, which takes “time on the calendar” not just “time on the clock”. By that we mean that spending two hours on 3 consecutive days may be more productive than trying to spend 6 hours at once on the assignment.

## Grade Cutoffs

GRADING SCALE:

Percentage Minimum Grade

95 and up A

90-93 A -

87-89 B +

84-86 B

80-83 B -

77-79 C +

74-76 C

70-73 C -

67-69 D +

64-66 D

60-63 D -

59 and below F

Our goal is that the different grades have the following rough meaning.

**A+/A**   
You can do *all* the assignments *on your own*.

**B+/A-**You understand nearly everything, and should be all set to use this knowledge in other courses or in a job.

**B-/B**

Most things you understand very well and a few you might not (more towards the former for a B and more towards the latter for a C).

**C/C+**  
Learned enough and have the minimum skills to move on in the subject.

**D+/C-**   
You did put some effort in, and understand many things at a high level, but you haven’t mastered the details well enough to be able to use this knowledge in the future.

**D-**

Students will normally *not* get an F if - you attend 80% of the lectures, complete some of the assignments up through the end of the course, and get nearly half of the problems on the final exam correct.

**F**   
Normally, students that get an F simply stopped doing the required work at some point.

# Blackboard

The course has a blackboard site. Click [here](http://blackboard.indstate.edu) to go to blackboard. You should see this course listed under your courses for the current term.

# Academic Integrity

Follow the standard CS course policies in terms of what is and is not allowed on assignments: <http://cs.indstate.edu/info/policies.html>

Please ask the instructor if you have doubts about what is considered cheating in this course.

# Special Needs / Student Disabilities

Indiana State University recognizes that students with disabilities may have special needs that must be met to give them equal access to college programs and facilities. If you need course adaptations or accommodations because of a disability, please contact us as soon as possible in a confidential setting either after class or in my office. All conversations regarding your disability will be kept in strict confidence. Indiana State University's Student Support Services (SSS) office coordinates services for students with disabilities: documentation of a disability needs to be on file in that office before any accommodations can be provided. Student Support Services is located on the lower level of Normal Hall in the [Center for Student Success](http://www.indstate.edu/services/student-success/cfss) and can be contacted at 812-237-2700, or you can visit the ISU website under A-Z, [Disability Student Services](https://www.indstate.edu/services/student-success/cfss/student-support-services/disability-student-services) and submit a Contact Form. Appointments to discuss accommodations with SSS staff members are encouraged.

Once a faculty member is notified by Student Support Services that a student is qualified to receive academic accommodations, a faculty member is obligated to provide or allow a reasonable classroom accommodation under ADA.

# **Disclosures Regarding Sexual Misconduct**

*Standard language included in the syllabi for ISU courses.*

Indiana State University fosters a campus free of sexual misconduct including sexual harassment, sexual violence, intimate partner violence, and stalking and/or any form of sex or gender discrimination. If you disclose a potential violation of the sexual misconduct policy I will need to notify the Title IX Coordinator. Students who have experienced sexual misconduct are encouraged to contact confidential resources listed below. To make a report or the Title IX Coordinator, visit the Equal Opportunity and Title IX website:<http://www.indstate.edu/equalopportunity-titleix/titleix>.

The ISU Student Counseling Center – HMSU 7th Floor | 812-237-3939 | [www.indstate.edu/cns](http://www.indstate.edu/cns)

The ISU Victim Advocate – Trista Gibbons, trista.gibbons@indstate.edu

HMSU 7th Floor | 812-237-3939 (office) | 812-230-3803 (cell)

Campus Ministries - United Campus Ministries | 812-232-0186

<http://www2.indstate.edu/sao/campusinistries.htm>

[www.unitedcampusministries.org](http://www.unitedcampusministries.org/) | ucmminister2@gmail.com

321 N 7th St., Terre Haute, IN 47807

For more information on your rights and available resources<http://www.indstate.edu/equalopportunity-titleix/titleix>

**COVID-19 related (for face-to-face sections):**

**Illness:**Students who are ill, under quarantine for COVID-19, or suspect they are ill will report that to Student Affairs. Student Affairs will verify and notify all faculty who have that student. Once notification is made, all faculty will make every reasonable effort to accommodate the student’s absence and will communicate that accommodation directly to the student.   Students who need to report an illness should contact [Office of the Dean of Student](https://www.indstate.edu/student-affairs/dean), at the following website <https://cm.maxient.com/reportingform.php?IndianaStateUniv&layout_id=23>.  They may also call:  **812-237-3829**.

**Masks/Shields:** Masks/Shields will be worn by all students and faculty in classrooms as well as in buildings (unless you are alone in an office). What is said/printed on a mask will be held to the same Student Code of Conduct standard as if it were printed on a shirt or hat. As a result, a political statement such as MAGA, BIDEN2020, or BLM is not grounds for demanding that it be removed/replaced. In judging what constitutes an offensive statement on a mask, the determination will be made by Student Affairs using the Student Code of Conduct. If there is a question about a mask, the faculty member will refer the matter to Student Affairs and only insist upon its immediate removal if there is no doubt that it violates the Code. Medical waivers will be made through Student Affairs and students with such a waiver are expected to carry the documentation with them and present it when asked.

**Laptops/Technology:**It is the responsibility of all students to have equipment sufficient to participate in all their classes. All students must have a computer/tablet with audio and video capability. Students will follow the appropriate instructions of their faculty regarding the muting (or unmuting) of audio and video as they would in any classroom setting.

**Traffic flow and social distance:**Students and faculty will respect the need for social distancing to the degree possible by the setting.Faculty and students will move in and out of the classroom as per the appropriate instructions of the faculty/administration. They are expected to follow printed traffic flow statements posted in all rooms and buildings.

**In-class seating:**  Faculty are asked to assign students seats in the classroom, using social distancing as possible. The assigned seating chart is to be used all semester and kept by faculty as to facilitate contact tracing and help limit any secondary quarantines.

**Cleaning of Space:**Students are encouraged to clean the surfaces of the chairs/tables/desks they occupy before they sit down and as they prepare to leave. Faculty should advise students to bring cleaning wipes or cloths to clean their own personal space if they want or to be sure to use hand sanitizer on the way in and way out of the classroom.

Faculty are encouraged to clean lecterns and any items they will or do touch.In addition, faculty should plan to bring their own materials for whiteboards and chalkboards.

**Refusal:** Refusal to comply with any appropriate request will be treated as would any classroom disruption (request to change the behavior; request to leave the class; dismissal of the class and referral to Student Affairs.)

**Classroom Space**

The university recommends that face-to-face classroom space be kept to 50% capacity or below. Departments are encouraged to seek guidance from the CDC, disciplinary, and/or professional organizations (as appropriate) on ways to accommodate social distancing with pedagogy and course delivery.  In the majority of face-to-face settings, every effort should be made to space students at an equal distance.

Faculty are encouraged to work with chairpersons on flexible pedagogical strategies that will account for classroom capacity restrictions.

ADDITIONAL INFORMATION ABOUT THE COURSE:

[1] For asynchronous online sections of a class, some video content will be placed on

Blackboard.

[2] Office Hours: These will be online and by appointment.

[3] Face-to-face classes will be held in the scheduled room , at the scheduled time, and the instructor

will be present in the class for the entire duration of the class.

[4] Social Distancing for Face-to-Face classes:

(when the number of students exceeds 18 for room Root Hall , A-019):

Students in the class will be divided into two equal groups, GROUP1 and GROUP2.

Every class period will be divided into two equal periods: PERIOD1 and PERIOD2.

GROUP1 will attend PERIOD1 every time the class meets.

GROUP2 will attend PERIOD2 every time the class meets.

Students will be seated according to a seating plan.

Students will be able to find if they are in GROUP 1 or GROUP 2 by checking the GROUP column

in the Gradebook on BlackBoard.

[5] For face-to-face classes, attendance will be taken in class.