

CS 1002 Programming Fundamentals

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About Me !

- Associate Professor, FAST-NU
 - PhD in Networks and Distributed Computing,
 - University of Nice-INRIA, France 2011
- Director ORIC (Office of Research, Innovation and Commercialization)
 - All research projects, industry collaborations, grants, Commercialization
- Chief Scientist Quest Lab & UAV Dependability Lab
- Director, Pakistan Software Testing Board
 - Representative of ISTQB in Pakistan
- Senior Member & Chair of IEEE Islamabad Section
- Recipient of over ~150 Million PKR in research grants/projects
- Over 15 years of industry/academia experience
 - Expertise: Engineering Reliable Software Systems, Software Testing and Qualification, Standards for Safety and Business Critical Systems
- Founder/ Member Board of Directors / Advisor for multiple Companies

Why Software Engineering ?

“Software engineers, sometimes called software developers, create software for computers and applications”

If you're an analytical thinker who enjoys solving problems and making digital products easier to use, this is the field for you

”deals with the design, development, testing, and maintenance of software applications. Software engineers apply engineering principles and knowledge of programming languages to build software solutions for end users”

Why did YOU choose SE ?

- Introduction
 - Name, which school are you from ?
 - What's your previous exposure to computers ?

WHY are you HERE

I heard from my brothers/senior friends that Software Engineers are awesome ..

Could not get admission in CS ..



My Dad /Mother /Uncle /thrice removed *chachoo* made me ..

I actually know what I am getting into and did some reading before hand

Course Objective

1. **Understand** basic problem-solving steps and logic constructs.
 2. **Apply** basic programming concepts.
 3. **Design and implement algorithms to solve real-world problems.**
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Syllabus

Week-01	Introduction to course, Motivation, Overview of Software Engineering Introduction to Programming, Setting up the environment, and basic concepts of problem solving Installation of Ubuntu and g++ compiler, shell commands
Week-02	Introduction to pseudo-code, algorithms, and flow chart with scratch
Week-03	Basic program writing in C++ and stream insertion/extraction operators
Week-04	Operators (arithmetic and bitwise)
Week-05	Functions (definition, calling, forward declaration, and parameter passing by value)

Syllabus

Week-06	Conditional structures-I (if-else)
Week-07	Conditional structures-II (switch-case)
Week-08	Repetitions-I (while loop, for loop)
Week 09	Repetitions-II (do-while loop, nested loops)

Syllabus

Week-10	Arrays-I (1D arrays)
Week-11	Arrays-II (char and multi-dimensional arrays)
Week-12	Functions passing by reference
Week -13	Basic File Handling
Week-14	Introduction to pointers and dynamic memory allocation (for 1D)
Week-15	Dynamic memory allocation (2D, and 3D)
Week-16	Other Topics

Tentative Marks Distribution

- Midterms (2) 20%
 - Quizzes (surprise + announced) 5%
 - Assignments 20%
 - Term paper/ Presentation 10%
 - Project 15%
 - Final 40%
-

Assignments & Quizzes

- A number of assignments will be given throughout the semester,
 - Approximately 1 every 2 weeks
 - All assignments are on individual basis
 - Retake of missed assessment items (other than midterm/final exam) will not be held
 - There are no makeups for missed quizzes
-

Classroom Conduct & Ethics

- Students are required to ensure 100% attendance in the course
 - Students are not allowed to use their mobile phones or laptops during the class
 - Laptops may be used during the classes where you are explicitly asked to bring them for practice
 - Attendance Policy
 - Your attendance is your concern !
 - You are required to maintain 90 % attendance at the minimum
 - Later arrivals (after 10 mins) are marked absent
-

Lecture Format

- Start with Q & A
- Main Lecture
 - No any short break in the middle
- This is not entirely a lecture course rather an in-class Lab
 - You need to code and develop hands on experience on various programming techniques.
 - A parallel mandatory lab session
- Discussions are important
 - Do participate

Overview of Course

- Goal is to give students a roadmap and make it easier for them to learn the details on their own
 - If you work hard, you will know the basics of a lot of different programming techniques
 - You will understand when they are used and the relative strengths and weaknesses
- The course will help to utilize the incredible power of software programs to solve an extremely wide range of problems using **programming practices and tools.**

Assignments and Projects

- Where ~80% of your learning will take place
- For learning, not evaluation -> low marks
- Posted to google class web site and Slate
- Usually creating complete program or parts of programs based on provided code
- Majority assignments done as individual, some can be done with a partner
- Graded on correctness, style, efficiency, generality, comments, testing
 - not graded on a linear scale or on effort
- Program must work, compile errors / runtime errors lose all correctness points
- Copying solution code or giving code to someone else is **CHEATING leading to F** in the course

Succeeding in the Course

- Download code or lecture materials from the course folder
- Walk through examples and read books (2 to 3 hours)
- Keep on learning new techniques
- Do the extra section problems
- Start on assignments early
- Ask questions and get help when needed
- Read the “Code of honor”.
- Talk with your peers
 - Share ideas, not code/syntax.
 - Mention it in the report.
- Don’t get stuck for too long

Evaluation/Assessment

- No “**average marks**” possible for missing sessional and exams.
- Retake of missed assessment items (other than midterm/ final exam) will not be held.
- For a missed midterm/ final exam, an exam retake/ pretake application along with necessary evidence are required to be submitted to the department secretary. The examination assessment and retake committee decides the exam retake/ pretake cases.
- **Absolute Grading**

Textbooks and Supplementary Reading List

- Tony Gaddis "STARTING OUT WITH C++" 8th Edition
- Paul Deitel, Harvey Deitel "C++ How to Program" 10th Edition
- Walter Savitch "Problem Solving with C++" 10th Edition
- Beginning C++: From Novice to Professional 6th Edition Ivor Horton
- Several Readings

Course Plagiarism Policy

- **Plagiarism** in project or midterm/ final exam may result in F grade in the course.
- Plagiarism in an assignment will result in zero marks in the whole assignments category.

“You can fool some people some times but you cant fool all the people all the time”

-Bob Marley

Classroom Conduct & Ethics

- Students are required to ensure **100% attendance** in the course.
- Students **are not allowed to use their mobile phones or laptops (any gadget)** during class
- Students must come within **5 minutes** of the start of the class
 - Students arriving after 10 minutes of the start of the class will be marked as '**Absent**'.
 - I will not entertain any request of changing attendance or the so called “un-debar request”, rather strict action will be taken against such students.

Learning Management System

- We will use the following LMS google classroom for communication.

fsdelsl

Combined classroom

CS-1002 Programming Fundamentals A, B, C, D, E, F, G

45lupos

Section Specific

Joining Google Classroom

1

Make sure to login using NU ID

2

Google Classroom



Don't see your classes?
Try another account

You're currently signed in as



Uzair Khan
m.uzairkhan@gmail.com

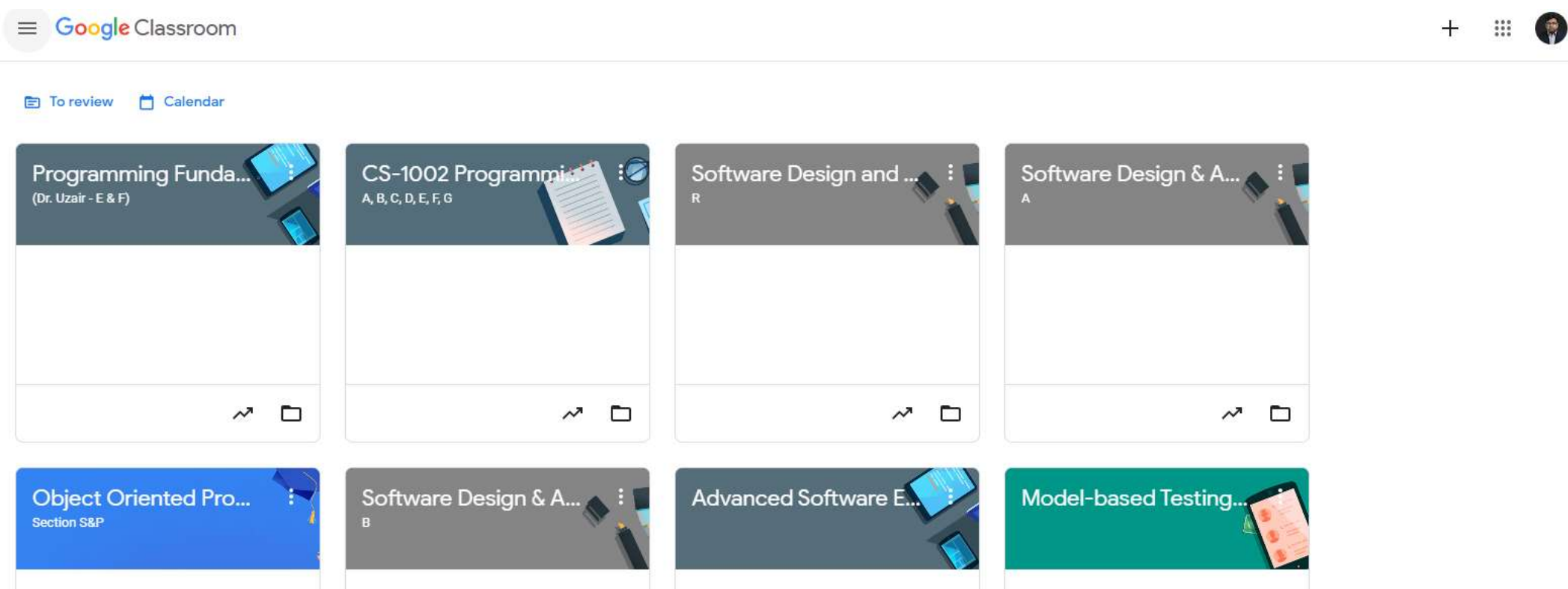
Switch account

Class code

Ask your teacher for the class code, then enter it here.

Class code

Classroom Interface





+ Create

Google Calendar Class Drive folder

All topics

Reading Material

Lectures

Assignments



Assignment 4(b) Sequence Diagrams (and P...

Due Apr 25



Reading Material



Applying UML Design and Patterns - Book

Posted Mar 1



Lectures



Lecture 17-18 Information Expert-Low Coup...

Posted Apr 21



Lecture 15-16 Responsibility Driven Design -...

Posted Apr 11



Lecture 12-13 Sequence Diagrams Notation ...

Posted Apr 7



Lecture 10 - 11 System Sequence Diagram (...)

Posted Apr 7



**LET'S SEE WHERE THE
WORLD IS MOVING !**

IT Skills to learn in 2022

22 IT Skills to Learn in 2022

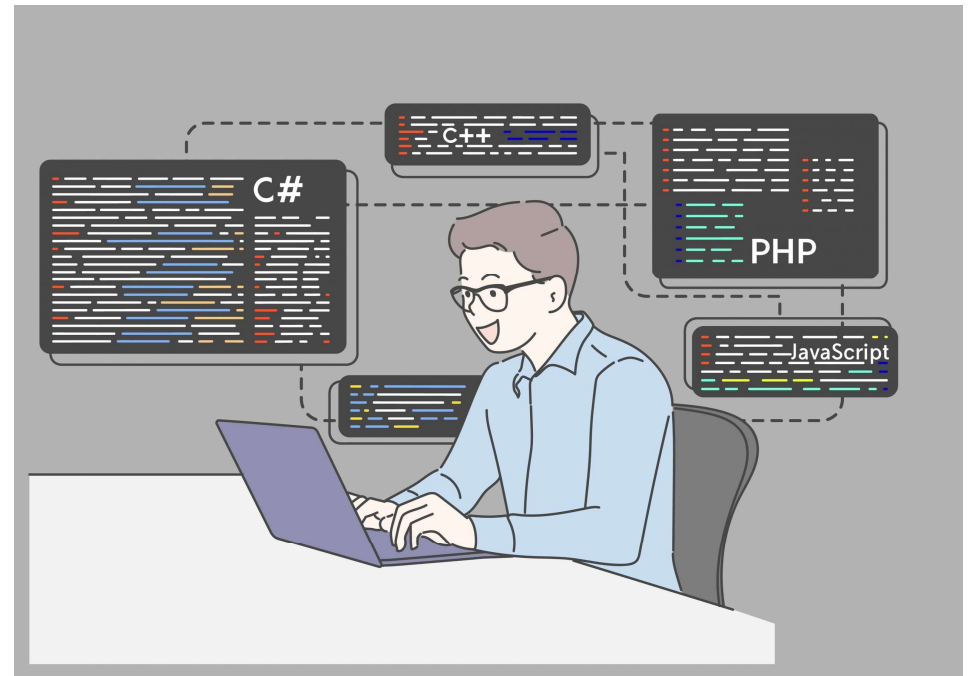
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|--------------------------------|-----------------------------|-------------------------|
| 1. Programming language skills | 8. Technical support | 16. Data visualization |
| 2. User experience | 9. Linux | 17. Data science |
| 3. Machine learning | 10. Risk analysis | 18. Big data |
| 4. Quality assurance | 11. Cybersecurity analytics | 19. Professional skills |
| 5. Mobile application skills | 12. Penetration testing | 20. Project management |
| 6. Networking | 13. Compliance | 21. Automation |
| 7. Cloud computing | 14. Database administration | 22. Business skills |
| | 15. Data analytics | |

AVERAGE SOFTWARE ENGINEER SALARIES IN 2021 THE TOP PAYING COUNTRIES

COUNTRY	AVERAGE SALARY
1. United States of America	\$83,082
2. Canada	\$72,412
3. United Kingdom	\$64,513
4. Netherlands	\$64,045
5. Germany	\$58,503
6. Belgium	\$56,260
7. France	\$52,052
8. Spain	\$37,655
9. Poland	\$34,138
10. Ukraine	\$28,184

10 best-paying jobs in Pakistan 2022

- Chartered accountant
- MBBS doctor
- **IT professional**
- Telecommunication engineer
- Judges and lawyers
- HR manager
- Bank manager
- Digital and video marketer
- Physiotherapist job in Pakistan
- Marketing manager



ACADEMYSMART.COM

TOP 15 HIGHEST PAYING SOFTWARE JOBS IN

2021



**BIG DATA
ENGINEER**



**DEVOPS
ENGINEER**



**INFORMATION SYSTEMS
SECURITY MANAGER**



**MOBILE
APPLICATIONS
DEVELOPER**



**APPLICATIONS
ARCHITECT**



**DATA
ARCHITECT**



**DATABASE
MANAGER**



**DATA SECURITY
ANALYST**



**DATA
SCIENTIST**



**NETWORK/CLOUD
ARCHITECT**



**NETWORK/CLOUD
ENGINEER**



**SENIOR WEB
DEVELOPER**



**SITE RELIABILITY
ENGINEER**



**SYSTEMS
ENGINEER**



**SOFTWARE
ENGINEER**

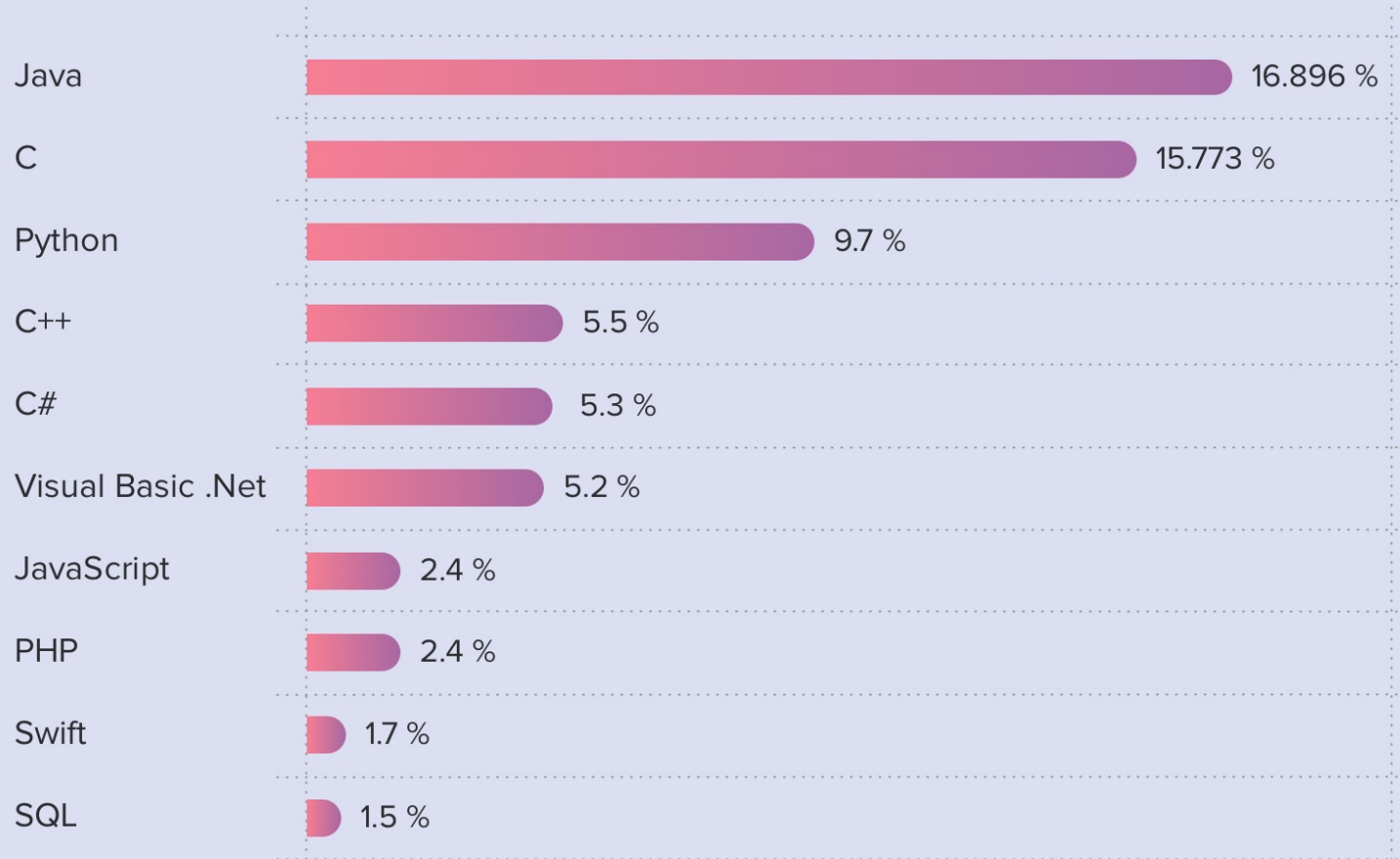




TOP 10 Programming languages for 2022

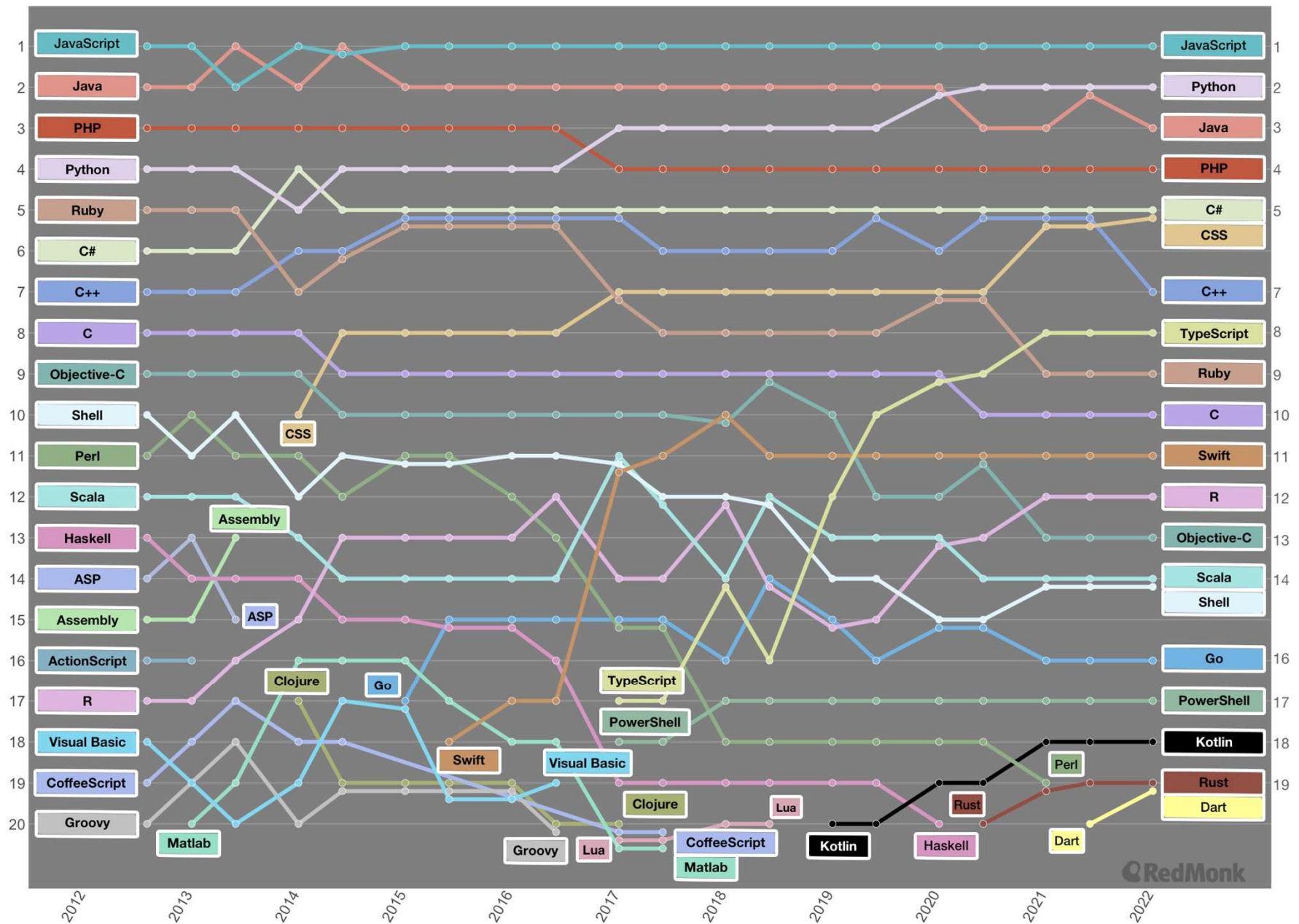


Top programming languages, TIOBE



RedMonk Language Rankings

September 2012 - January 2022













Where FAST Students Stand !

P@SHA

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University Ranking for Research & Innovation

According to the data by 175 companies, these universities are considered top 10 for research and innovation.










Rank	Votes	Top 10 Universities for Research & Innovation
1	<div><div></div></div> 12%	NUCES-FAST (National University of Computer & Emerging Sciences) 
2	<div><div></div></div> 11%	NUST (National University of Sciences & Technology) 
3	<div><div></div></div> 8%	LUMS (Lahore University of Management Sciences) 
4	<div><div></div></div> 7%	NED (NED University of Engineering and Technology) 
5	<div><div></div></div> 6%	IBA (Institute of Business Administration) 
6	<div><div></div></div> 5%	COMSATS 
7	<div><div></div></div> 5%	GIKI (Ghulam Ishaq Khan Institute of Engineering Sciences and Technology) 
8	<div><div></div></div> 4%	UET (University of Engineering and Technology) 
9	<div><div></div></div> 4%	SZABIST (Shaheed Zulfikar Ali Bhutto Institute of Science and Technology) 
10	<div><div></div></div> 3%	SSUET (Sir Syed University of Engineering and Technology) 

P@SHA

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Overall University Ranking

Top 10 Universities - Nationwide

1 Rank		NUCES-FAST (National University of Computer & Emerging Sciences)
	Karachi, Lahore, Islamabad University Location	1 Rank - Preference for Higher Salary 1 Rank - Research 1 Rank - No. of Employees
2 Rank		NUST (National University of Sciences & Technology)
	Islamabad, Karachi University Location	2 Rank - Preference for Higher Salary 2 Rank - Research 4 Rank - No. of Employees
3 Rank		LUMS (Lahore University of Management Sciences)
	Lahore University Location	3 Rank - Preference for Higher Salary 3 Rank - Research 7 Rank - No. of Employees
4 Rank		COMSATS
	Islamabad, Lahore University Location	8 Rank - Preference for Higher Salary 6 Rank - Research 2 Rank - No. of Employees
5 Rank		GIKI (Ghulam Ishaq Khan Institute of Engineering Sciences and Technology)
	Islamabad University Location	5 Rank - Preference for Higher Salary 7 Rank - Research 5 Rank - No. of Employees
6 Rank		IBA (Institute of Business Administration)
	Karachi University Location	4 Rank - Preference for Higher Salary 5 Rank - Research 12 Rank - No. of Employees
7 Rank		UET (University of Engineering and Technology)
	Lahore, Islamabad University Location	7 Rank - Preference for Higher Salary 8 Rank - Research 7 Rank - No. of Employees
8 Rank		NED (NED University of Engineering and Technology)
	Karachi University Location	5 Rank - Preference for Higher Salary 4 Rank - Research 14 Rank - No. of Employees
9 Rank		BU (Bahria University)
	Karachi, Lahore, Islamabad	9 Rank - Preference for Higher Salary 13 Rank - Research 3 Rank - No. of Employees