

Sophomore IOI

Dept of CSE

An initiative by SMP and UGAC

Overview

Intro to the Department

The Council

Research Opportunities

Second Year Courses

Non Core Opportunities

The DAMP Team

UGAC and SSS

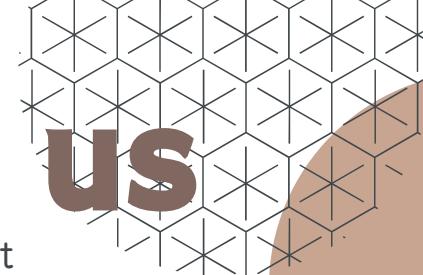
Revised Curriculum

Core Opportunities

Branch Changer Insights

Where to find us

Started out as a small room in the EE dept



**New CSE
Building**

“The white colored building that does not look white” – Prof. Biswa

Where to find us

Started out as a small room in the EE dept



KReSIT

Homework: Find the full form

Part time dining hall, home to a beloved canteen

Intro to the DAMP Team

What do we do?

- Add content to and manage the DAMP blog which contains:
 - Course reviews
 - Intern reviews
 - Resources
 - And many more things coming soon!
- Organizes TSCs and Help Sessions for Sophomore students
- Collaborates with the DUGC to take surveys and give the students' voice while taking important decisions

Department Coordinators



Dhruv Piyush
Rambhia



Parshant Arora

Senior Mentors



Akshat Kumar

Dhananjay Kejriwal

Vatsal Goyal

Female Mentors



Adyasha Patra



Deepasha



Hriswitha Ijjada



Isha Arora



Namrata Jha



Komma Sharanya

Male Mentors I



Aadish Sethiya



Akshat Singh



Akshay Padakanti



Ameya Deshmukh



Ameya V. Singh



Ashwin Abraham

Male Mentors II



Ashwin Goyal



Atishay Jain



Balaji Siddardha



Harsh Poonia



Hitesh Kumar

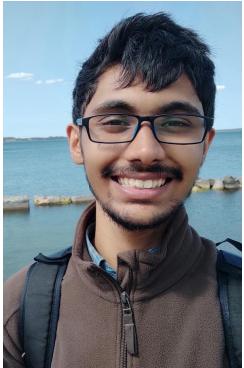


Karan Godara

Male Mentors III



Kartik S. Nair



Krishna N. Agaram



Lisan Kadivar



Mridul Agarwal



Naman Singh Rana



Premankur Chakraborty

Male Mentors IV



Prerak Contractor



Sainath Vavilapalli



Siddharth Bhuva



Rishit Shrivastava



Shantanu Welling



Ramavath Sai Srithan

Male Mentors V



Tanay Tayaal



Veeresh Patil



Introduction to the Council

The Department Council – CSEA
By Vudit Goel, Department General Secretary

**Department
General Secretary**



Vudit Goel

**Associate
Department
General Secretary**



Ashwin Abraham

UG2 Class Representatives



Anilesh Bansal



Keshav B Vignesh

UG3 Class Representatives



Adyasha Patra



Anish Kulkarni

Council Structure

Botla Venkata Saikiran
(CSEA General Secy)

Mridul Agarwal
(Joint Social Secy)

Soham Dahane
(UG Social Secy)

Yashwanth
(UG Social Secy)

Pranay Midathana
(Joint Sports Secy)

Shashi
(UG Sports Secy)

Sharvanee Sonawane
(UG Sports Secy)

Council Nominees

- Design Nominee – Sanskar Shaurya
- Media Nominee – Anirudh Garg
- Web Nominee – Shreya Tiwari
- Alumni Secy – Daya Swaroop



Traditional Day aka Trad Day



Department Trek



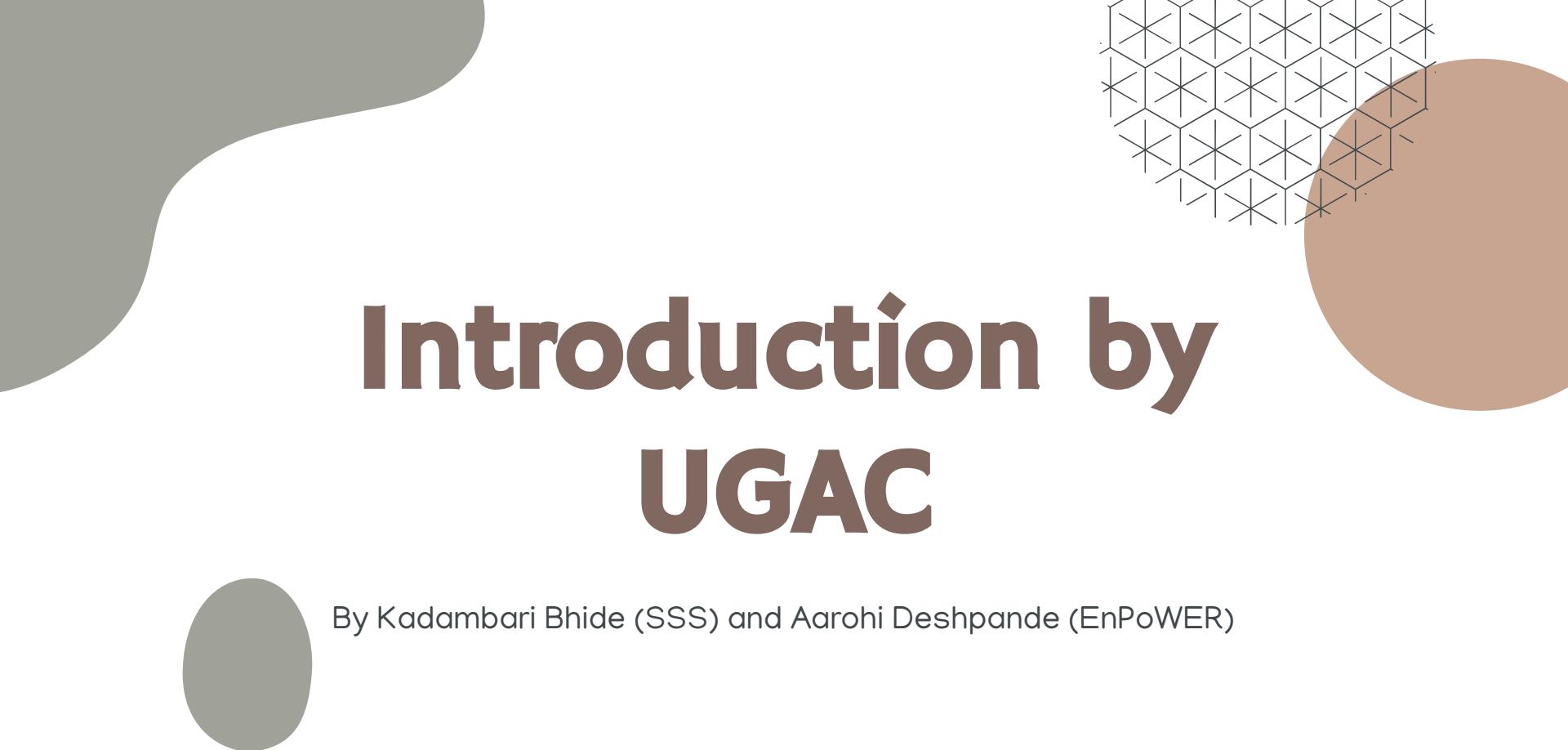


Volleyball Tournament



Football Tournament





Introduction by UGAC

By Kadambari Bhide (SSS) and Aarohi Deshpande (EnPoWER)

Research Opportunities

By Aaryan Gupta, Department Research Coordinator

Broad Research Areas (I)

- **Artificial Intelligence**

- Voice Recognition (Siri)

- Image Processing (Random face Generator)

- Language Models (ChatGPT)

- Theoretical ML (the math behind this stuff, usually a lot of probability and linear algebra)

- **Theoretical Computer Science**

- Algorithms (Google Maps)

- Complexity Theory (P vs NP – a millennium problem)

- Cryptography

Broad Research Areas (2)

- **Systems**

Compilers (Building a faster language for a specific use)

Architecture (Building better hardware for our computers)

Networks (all things related to the internet)

Databases

- **Interdisciplinary Areas** (a lot of cool things happening here):

With Physics – Quantum Computing

With Biology – Computational Biology

With Philosophy – Ethics of Artificial Intelligence

With Economics- EconCS, Game Theory, etc

How can you participate?

- **Rnd Projects, Supervised Learning Projects**

With a professor at IITB for 6 credits

- **Bachelor's Thesis Projects**

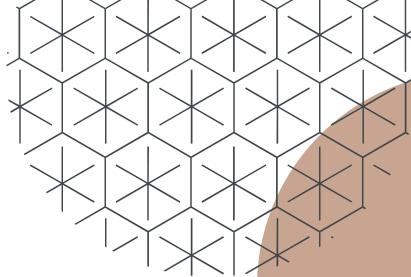
Usually done in your final year

- **Research Internships**

During the coming summers. You can either apply on your own by emailing or through the Placement cell.

- **Attend Research Talks**

Check out your webmail and join mailing lists. Most talks by researchers are super accessible to undergraduates. You might also get free snacks and tea after the talk if that motivates you :)



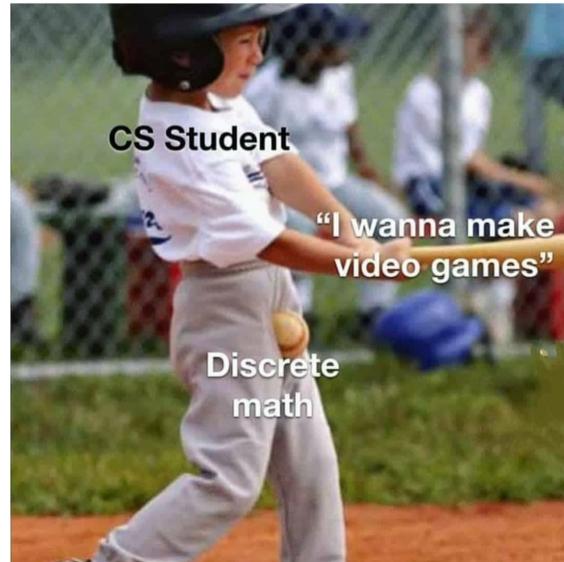
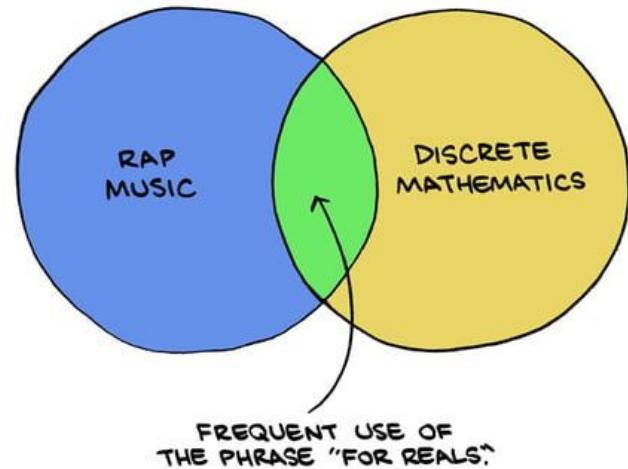
CSE CORE COURSES

By Dhruv Piyush Rambhia, the D-AMP Coordinator

CS 207

Discrete Structures

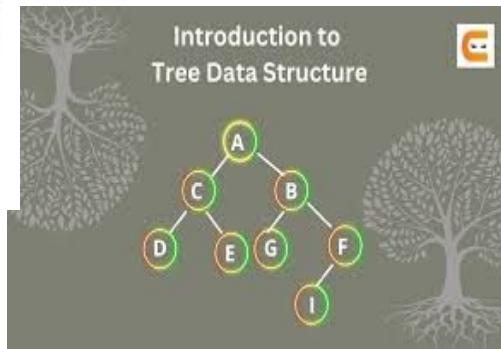
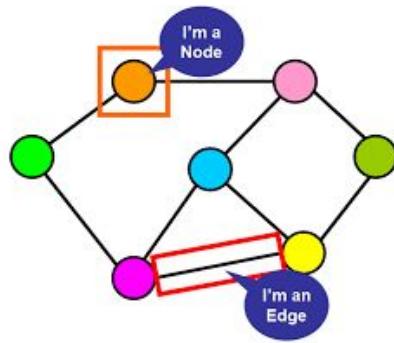
Covers ‘discrete’ (as opposed to continuous) math fundamentals for Computer Science, like Number Theory, Partial Orders, Boolean Algebra, Relations, Functions and Graph Theory. This course is mainly problem-solving oriented. Skip a class and the content feels almost greek.



CS 213

Data Structures and Algorithms

The most basic CS course, it is about organizing the data effectively on a computer, using appropriate ‘structures’ like Linked Lists, Trees, Heaps, Graphs etc. Also involves a few algorithms on these data structures. The lab involved weekly assignments implementing step-by-step aspects of a large system (like a Rail Planner).



CS 293

Data Structures and Algorithms Lab



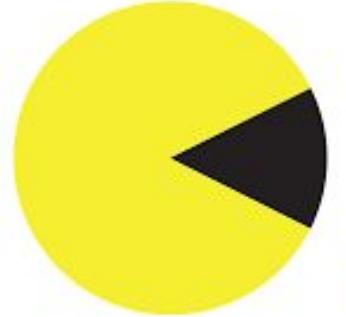
CS 215

Data Analysis and Interpretation



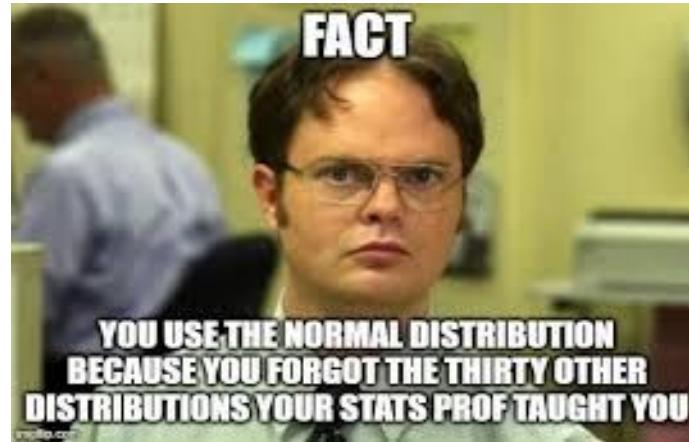
An introduction to probability and statistics, including expectation value, variance. A focus on various statistical estimators and their applications (MLE, Bayesian). Also involved some programming assignments involving Monte Carlo, Bayesian and Principal Component Analysis. All in all lots of new things to learn.

Probability of me ever maturing



None

Also none, but
in yellow to
make Pac-Man

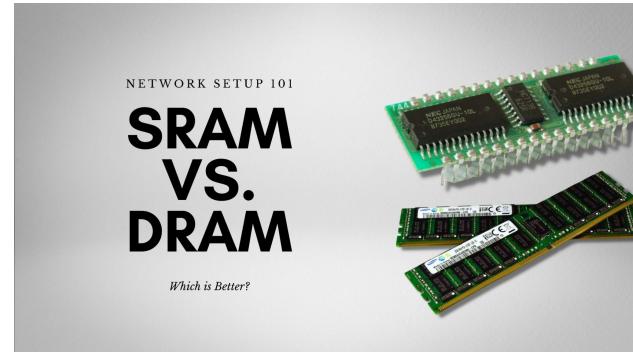
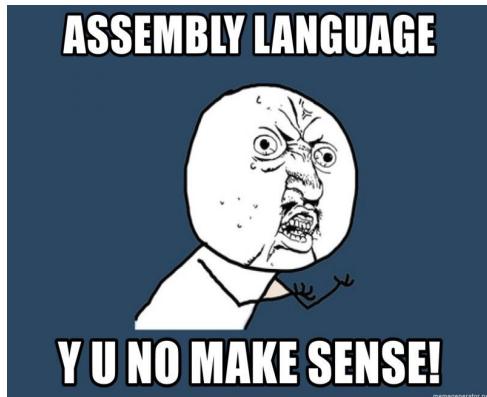
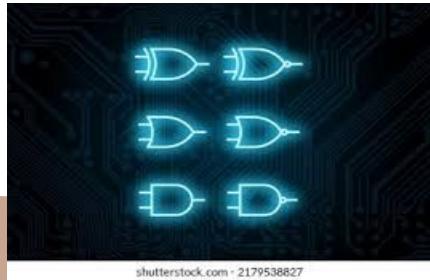


CS 230

CS 232

Digital Logic Design and Computer Architecture + Lab

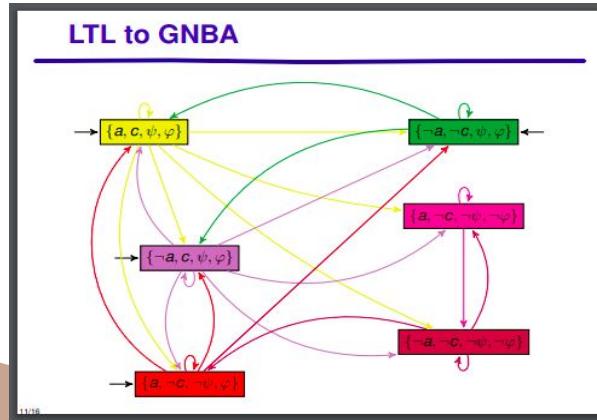
The first systems-oriented course in the curriculum. This course goes “under the hood” of a computer and observes the procedures that make your computer run. Lots of interesting design details like caches, prefetching and virtualization are analyzed. The lab involved 5 assignments about simulating various aspects of computer architecture.



CS 208

Logic for Computer Science

One of the most abstract courses in the syllabus, this course introduces formal logic, from a CS perspective. Covers propositional logic, SAT solvers, First Order logic, followed by Linear Temporal Logic and Model Checking applications.



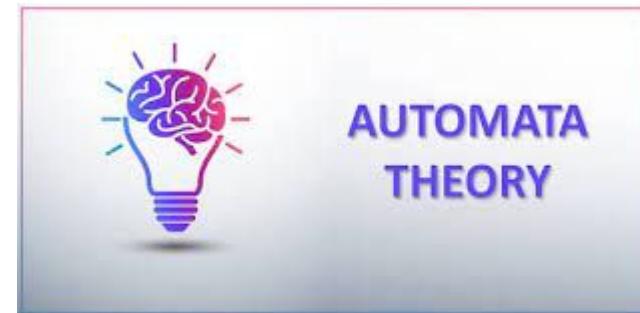
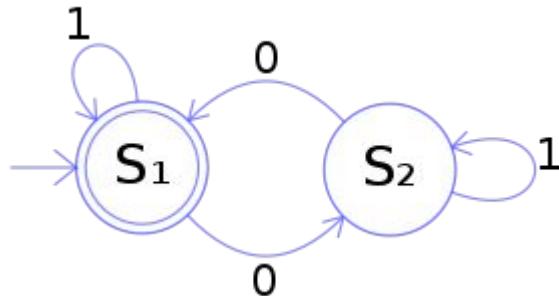
when the mid sem exam and quizzes were pretty straightforward but the professor made the final exam paper very challenging



CS 208

Automata Theory

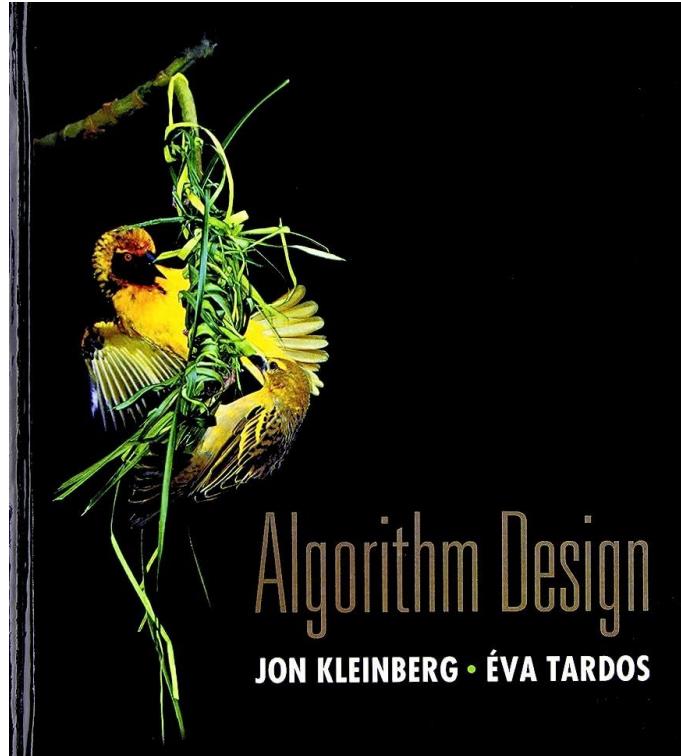
The course is a continuation of the second part of Logic, and covers the fundamental theory of computation. It is also significantly abstract in nature, but has direct application in the upcoming compilers course.



CS 218

Design and Analysis of Algorithms

This course is about learning the general principles and techniques of designing algorithms, through the means of various problems like Greedy Algorithms, Dynamic Programming Problems, Network Flow, and Combinatorial Optimization. The reference book for this course is an excellent resource.



CS 351

Computer Networks

CS378

Computer Networks Lab

A very information oriented course about the structure and maintenance of the internet. Takes a layer-by-layer bottom up approach towards building a large computer network. Analyzes protocols such as TCP/IP in detail. The lab was to observe packets being sent at various layers of the internet stack and confirming the design aspects.



CS353 + CS355

Abstractions and Paradigms in Programming + Lab

Course covers the program development process,
Issues in program design, Structured programming
and other good programming practices.

Ideas behind imperative, applicative, object oriented
and logic programming paradigms such as pure
functions, recursion, higher order functions,
encapsulation, inheritance, backtracking.



Haskell



SWI Prolog

CS 236

Operating Systems Lab

CS 234

Operating Systems

The course is about how the interface between hardware and user is organised in the form of an OS, using xv6 and Linux as model OSSs. Covers process management and memory management. The lab involves implementing these basic aspects like system calls etc.



CS 238

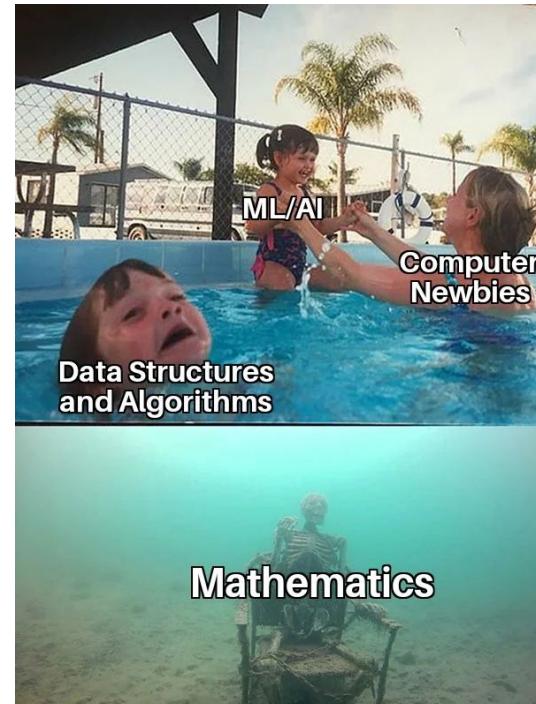
Artificial Intelligence and Machine Learning Lab

An introduction to AI fundamentals, from a chronological pov. Also covers some selected modern applications like NLP etc. The course is at an introductory level and can be supplemented with the many specialized electives in this area.



CS 240

Artificial Intelligence and Machine Learning



CS 320

Implementation of Programming Languages

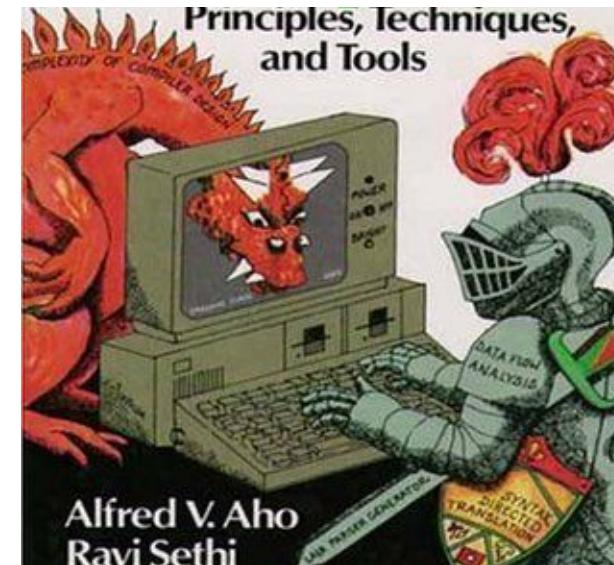
Ever wondered what goes on beneath the hood when you type g++ test.cpp?
This course covers from start to end what happens when a piece of code is given to be compiled and how runtime environments are setup when you run an executable. It sits at an intersection of algorithms, Automata Theory and Operating Systems



CS 306

Implementation of Programming Languages Lab

In this course, you make your own compiler! You build from scratch your own compiler for a C-like simple language



CS 357

Database and Information Systems

An overview of database management software and the paradigms of large data handling. Includes relational databases and query languages like SQL. Also covers some special topics like data mining.

Table: customers

customer_id	first_name	last_name	phone	country
1	John	Doe	817-646-8833	USA
2	Robert	Luna	412-862-0502	USA
3	David	Robinson	208-340-7906	UK
4	John	Reinhardt	307-242-6285	UK
5	Betty	Taylor	806-749-2958	UAE

CS 349

Database and Information Systems Lab



The Revised Curriculum

By Ashwin Abraham, the Associate DGSec

Year I

Semester I		
CS 101	Computer Programming	6 credits
CS 103	Computing & Science	6 credits
MA 109	Calculus I	4 credits
MA 111	Calculus II	4 credits
CH 105	OC & IOC	4 credits
CH 107	Physical Chemistry	4 credits
PH 117	Physics Lab	3 credits
HASMED		8 credits
Total		39 credits

Semester II		
CS 104	SSL	6 credits
BB 101	Biology	6 credits
MA 106	Linear Algebra	4 credits
MA 108	Differential Equations	4 credits
PH 111	Classical Physics & STR	4 credits
PH 112	Quantum Physics	4 credits
CH 117	Chemistry Lab	3 credits
MS 101	Makerspace	8 credits
Total		39 credits

Year II

Semester III		
CS 207	Discrete Structures	6 credits
CS 213	DSA	6 credits
CS 215	Data Analysis and Interpretation	6 credits
CS 230	DLDCA	6 credits
CS 232	DLDCA Lab	3 credits
CS 293	DSA Lab	3 credits
EC 101	Economics	6 credits
Total		36 credits

Semester IV		
CS 208	Logic and TOC	6 credits
CS 218	Design and Analysis of Algorithms	6 credits
CS 234	OS	4 credits
CS 236	OS Lab	3 credits
CS 238	AI/ML Lab	3 credits
CS 240	AI/ML	6 credits
HASMED		6 credits
Total		34 credits

Year III

Semester V		
CS 351	Networks	4 credits
CS 353	Paradigms	4 credits
CS 355	Paradigms Lab	3 credits
CS 378	Networks Lab	3 credits
CS xxx	Dept elective	6 credits
XY xxx	STEM elective	6 credits
HS xxx	HASMED elective	6 credits
Total		32 credits

Semester VI		
CS 306	Compilers Lab	3 credits
CS 320	Compilers	6 credits
CS 349	Databases Lab	3 credits
CS 357	Databases	4 credits
CS xxx	Dept elective	6 credits
HS xxx	HASMED elective	6 credits
Total		28 credits

Year IV

Semester VII		
CS 492	BTP-I	6 credits
CS xxx	Dept elective	6 credits
XY xxx	STEM elective	6 credits
XY xxx	Any electives	12 credits
Total		30 credits

Semester VIII		
CS 496	BTP-II	12 credits
XY xxx	Any electives	18 credits
Total		30 credits

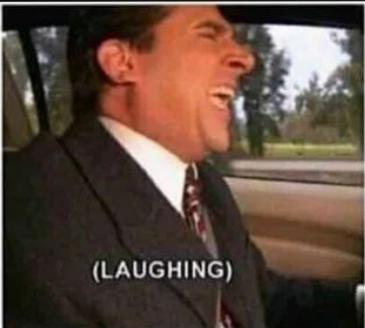


Opportunities in the Core Domain

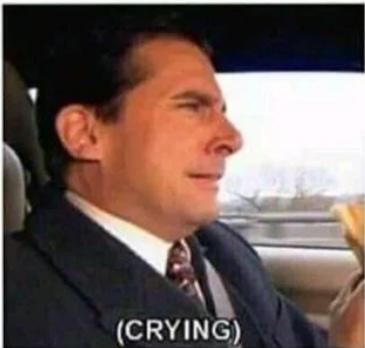


By Harsh Shah, an experienced Fourthie pursuing a career in Core CSE

**NO memes for this
part of the session**



**Looking at
programming
memes**



**Actually
coding**

Just kidding ;)



Okay, back to serious mode

Major Sub-domains

Broad sub-domains in Computer Science core:

- Systems Engineering (Very Very Broad)
- Computer and Network Security
- ML Engineering
- Quant trader/researcher (Debatable)

Systems Engineering

- This turns out to be a huge blanket of job opportunities
 - App development
 - Web development
 - Linux Kernel Development
 - Database Management

Systems Engineering(cont.)

Skillsets required

- Competitive Programming
- Computer Networking
- Operating System (heavily biased towards OS with linux kernel)
- Database and Information System
- Android development (good to know)

Companies : ALL

(Jane Street, Optiver, Quadeye, Microsoft, Google, blah blah)

Machine Learning

Skillset(s) required:

- Ummm....Machine Learning

Various branches of Machine Learning:

- Computer Vision
- Natural Language Processing
- Reinforcement Learning
- Automated Speech Recognition

Machine Learning (cont)

- Generative models
- Financial analysis

....and many more

(no sharp boundary between ML and statistics)

Companies :

Microsoft, Sony, Abode

Computer & Network Security

Skillsets required

- Computer Networks (ofc)
- Cybersecurity
- Cryptography

Companies : Rubrik, ig

Quant trader/researcher

Why debatable?

Work generally doesn't involve "core" Computer Science.

But many CS peeps end up here, so...

More money, but more working hours



Quant trader/researcher

Skillsets :

- Probability
- Statistical Maths
- Mental maths
- Machine Learning (good to know)

Companies :

Jane Street, Optiver, Quadeye, Alphagrep, World Quant, NK securities

Higher Studies

Good research over here...but most of us fly to foreign (US/
European countries) for higher education.

- Many universities provide specialization in masters' degree
- For PhD, you should have a good reason

- Artificial Intelligence
- Biocomputation
- Computer and Network Security
- Human-Computer Interaction
- Information Management and Analytics
- Real-World Computing
- Software Theory
- Systems
- Theoretical Computer Science

Specializations in Stanford

- Computer Vision
- Robotics
- Human-Computer Interaction
- Artificial Intelligence

Specializations in CMU

Anything else?

Some other fields that can be clubbed with systems engineering:

- XR development (AR/VR) (Sony)
- Game development (Winzo Games)
- MLops



Opportunities in the Non-Core Domain

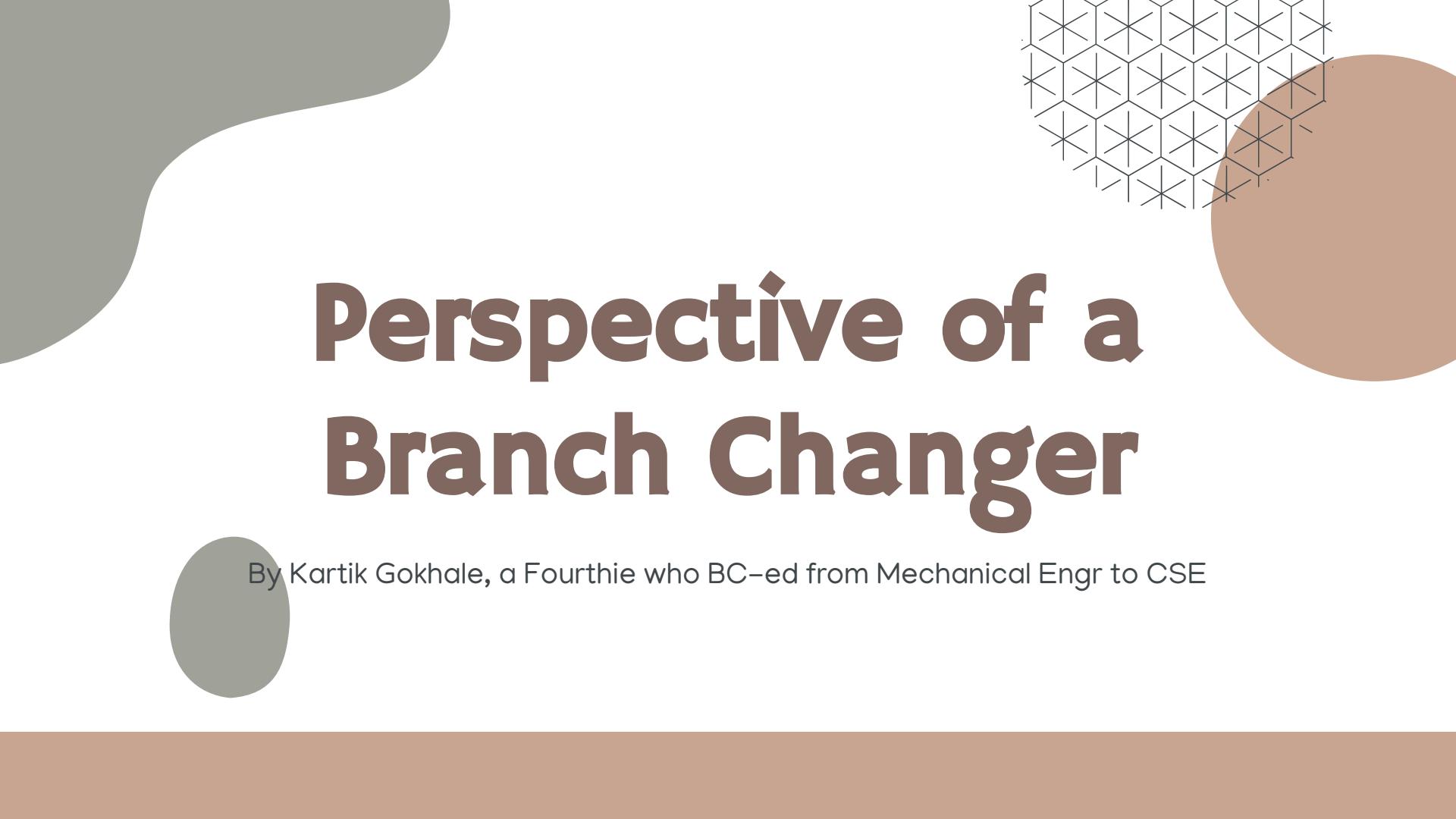
By Pinkesh Raghuvanshi, an experienced Fourthie pursuing a career in
Consulting

Major Non-core profiles

- Consult
- Finance / Trading
- Analytics
- Product Management / Business Analyst

Is Non-core for you?

- Skills required
- Working hours
- Profiles sought by companies
- Opportunities



Perspective of a Branch Changer

By Kartik Gokhale, a Fourthie who BC-ed from Mechanical Engr to CSE

BRANCH CHANGE (into CSE)



Average high CPI freshie



Welcome to CSE

- CSE - Branch changer's perspective
- What should you consider when branch changing?
(vs what you may consider)
- Demerits? Of branch changing
- Finally, should you go for it?

Common queries

Number of people selected

Why did I choose CSE?

Common difficulties faced by branch-change students

Difference of curriculum for branch-change students

And so...

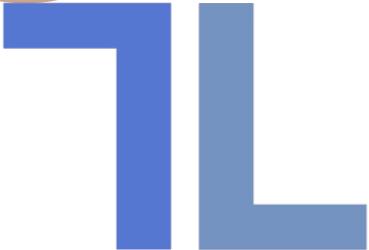


*CPI & other Terms and Conditions apply

Labs and Elective Offerings

By Dhruv Piyush Rambhia, the D-AMP Coordinator

Some of the Active Labs in CSE



IITB Trust Lab



E-Yantra/ERTS

InfoLab, IIT Bombay CSE
...where data meets intelligence

A photograph showing several researchers working at desks with multiple monitors in a laboratory setting.

[Home](#) [Research](#) [Publications](#) [People](#) [Teaching](#) [Conferences](#)

Home

IIT Bombay has a history of research and development in the area of data management, dating back to the early 1980s. Today, the group covers a wide range of [research areas](#) such as databases, data mining, information retrieval, and machine learning.

The March 2013 issue of the SIGMOD Record has an article titled "[Data-based Research at IIT Bombay](#)" that provides a detailed overview of the research that happens in our group.

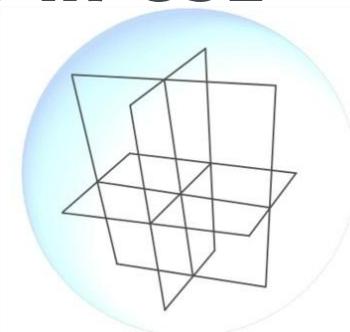
This site is under construction. The old site is [here](#).

InfoLab, IIT Bombay CSE

Proudly powered by [WordPress](#).

InfoLab

Check out all the
Labs at:
<https://www.cse.iitb.ac.in/research/labs.php>



VIGIL

The Machine Learning Lab

Some Popular Electives

Odd Semester

- CS 747 – RL by Prof. Shivaram Kalyan Krishnan
- CS 475 – Computer Graphics by Prof. Parag Chaudhari
- CS 6001 – Game Theory by Prof. Swaprava Nath
- CS 626 – Speech and NLP by Prof. Pushpak Bhattacharya

Even Semester

- CS 419M – Introduction to ML by Prof. Abir De
- CS 726 – Advanced ML by Prof. Sunita Sarawagi
- CS 736 – Medical Image Computing by Prof. Suyash Awate
- CS 765 – Blockchain and Cryptocurrencies by Prof. Vinay Ribeiro
- CS 769 – Optimization in ML by Prof. Ganesh Ramakrishnan



Credits:

Adyasha Patra

Ameya Vikrama Singh

Ashwin Abraham

Mridul Agarwal

Anirudh Garg

Sanskar Shaurya

Harsh Poonia

Thank you!

For more information, visit:

CSE Website: www.cse.iitb.ac.in

DAMP Blog: <https://csedamp.wordpress.com>

Students' Web Pages:

<https://www.cse.iitb.ac.in/people/students.php>

SMP Website: <https://smp.gymkhana.iitb.ac.in/>

UGAC Website: <https://ugac.gymkhana.iitb.ac.in/>