Self-Development Roadmap
B.Tech CSE/IT (4 year programme)

Programme Objectives

Computer Science Engineering and Information Technology UG Programmes have been designed primarily to suit the needs of the students who aspire to be the future engineers, managers or entrepreneurs with a strong grounding in accounting and finance. Developing analytical, communication and decision making skills of students is an important focus area throughout the duration of the programme. The students are encouraged to undertake assignments/project work from the industry and work towards finding possible solutions to integrate their theoretical knowledge with industrial practices. Keeping in view the employment potential, in-depth knowledge is provided to the students through specializations in computer networks, artificial intelligence, databases and information systems as well as computer programming and algorithms.

Career Prospects

- Mobile, Desktop and Web Applications Developers
- Software Engineers
- Software Testers
- Network Engineers
- Graphics Engineers
- Game Developers
- Software Marketing
- Search Engine Optimization
- ERP Solutions
- Education / Training
- IT Executive
- Hardware Engineer

Industry Expectation from students

- Good communication skills (written as well as oral)
- Better self-presentation ability of candidate
- Strong Technical skills
    - Thorough understanding of concepts (with applications) esp. for respective core job profiles
    - Strong programming skills esp. for development / testing profile jobs with product based companies
    - Dream employers like Microsoft, Amazon, Google, etc. hire candidates with
- Thorough knowledge of projects done by candidates and activities related to its development
    - At least 2 projects must be done by students as a team of 3-4 students to showcase their team work abilities
- Capability to work as good team player
- Capability to work as a good team leader
- Student must understand that in the fast moving world of technology, relationships are exceeding the priority level as compared to profiles. Hence, students must showcase flexibility in terms of:
    - Job profiles (just not stick to/prefer core profiles)
    - Job Location
    - Job timings/shifts
    - Bonds/Service agreements
    - Business mindset
- Talent in student that matches his/her expectation from industry/job profiles

Student Expectation from Industry

- Leading brands like Microsoft, Google, Amazon, Oracle, Infosys, TCS, IBM etc.
- Job / Career in core profile (e.g. Software Development, Testing)
- High paying jobs
- Near-by location

Significant points of attention for students to work on themselves

- **Academics**
  - Concentrate on academics (maintain CGPA above 6.7 and avoid any reappears/backlogs esp. during final year)
  - Be regular in attending all classes
  - Give due stress on foundation courses
    - Programming with C, C++, Java or .Net framework languages, SQL and PL/SQL
    - Data Structures
    - DBMS and its implementation with Oracle/MS SQL Server/MySQL
    - Operating Systems and Computer Networks
    - Computer Architecture
- **General Awareness**
  - Stay updated with latest news (current affairs)
  - Be aware of what is latest in Technology (e.g. Cloud computing, Virtualization, Mobile Development, Web Development, Data Analytics, etc.)
- **Web Presence**
  - Write Blogs and Posts (brandit.me, Quora, Blogger, Google+, Wordpress, etc.)
  - Secure a ranking in Competitive Programming arenas like CodeChef, HakerRank, etc.
  - Use Social Media to your professional advantage and career building
    - Create a LinkedIn profile for yourself and update it on regular basis
    - Post regular updates (technical/managerial but not personal) on your LinkedIn profile
    - Write Technical Pages on Facebook
    - Post your academic/professional achievements on social media
    - Keep updating your social media profiles
- **Resume**
  - Regularly update resume/CV and cover letter
  - CV must have an optimal presentation and readability for capturing employers' attention.
    - Look out for professional CV templates/samples at:
      - www.visualcv.com
      - www.cvmkr.com
      - https://www.myperfectresume.com/
      - https://www.resume.com/
      - http://www.super-resume.com/resume-templates/
  - Draft multiple resume/cover letters that correspond closely to the profile being applied for.
  - Create a **video resume** as it might give your wholesome visual presentation to the employer.
    - http://www.digitalcv.in/
    - Example of a Video CV / Video Resume of Software Engineer
    - Example of a Video CV / Video Resume of B.Tech CSE/IT Fresher
    - Another example of a good Video Resume
    - More samples available at www.digitialcv.in and YouTube

- **Activities on campus**
  - Enrol as members of student communities / clubs / student bodies being run in university by DSA, DCS, and schools.
  - Participate in sports, cultural and other co-curricular activities (like debates, quizzes, One India, One World, YouthVibe, etc.) held in university for an overall personality development
- **Online Events / Contests where students can participate:**
  - Participate in online Technical Contests / Challenges at following websites to sharpen your problem solving skills through programming and explore placement avenues for yourself:
    1. www.codechef.com
    2. https://www.topcoder.com
    3. https://projecteuler.net/
    4. http://www.spoj.com/ (Sphere Online Judge)
    5. http://codingbat.com/
    6. https://www.hackerrank.com/
    7. https://www.hackerearth.com/indiahacks-2016/ (8th Jan 2016)
    8. http://code.google.com/ (Google Code Jam)
    9. http://www.codeforces.com/contests (CodeForces)
    10. UVa Online Judge
    11. ACM International Collegiate Programming Contest (ICPC)
    12. Microsoft Imagine Cup
    13. TechGIG Challenges
    14. Indian Association for Research in Computing Science
    15. The International Obfuscated C Code Contest (IOCCC)
    16. Internet Problem Solving Contest (18 Jun 2016)
    17. International Conference on Functional Programming (Runs Jun – Aug each year)
    18. Oen Real Time Strategy (ORTS) Competitions
    19. HP Code Wars (January)
    20. The Hutter Prize Challenge (50'000€ Prize for Compressing Human Knowledge) Compress the 100MB file enwik8 to less than the current record
    21. Can Find more competitions at http://studentcompetitions.com/competitions

- **Online Courses (MOOC) for Self-paced e-learning**
  - Microsoft Virtual Academy
  - Coursera
  - Udemy
  - Udacity
  - The Khan Academy
  - Programming Hub

- **A Word of Advice**
  - Students must hone their skills to match with industry requirement and what they expect from industry for them.
  - Students must research on several companies that hire Computer Science freshers and must explore different ways to enter into those companies (like. Internships, contests, events/conferences, project showcases, student communities like Google ambassadors, Microsoft MSA/MSP)

Proposed Self-development Activities
(during academic sessions and during summer breaks)

Generic Instructions

- **Computer programming based courses**
  - The 5 hours for computer programming per week are never enough. Hence, student needs to **spare extra hours** out of the class to enhance their logic and programming aptitude.
  - Students must spend comprehensive time in **DIY (Do It Yourself) activities on personal equipment** like PC/laptops/mobiles.
  - Most of the programming courses run in **BYOD (Bring Your Own Device) model** where student use their laptops in class as their notebook as well as lab OTG (Lab On-The-Go) even after the class. They could always carry their class assignment to home and continue solving/enhancing the problems as and when free after the class.
  - Students must **code at least 150 programs, debug 500 codes** to practice and sharpen their programming logic.
  - Students must **crack beginner levels** of leading competitive programming platforms like Codechef, Hacker Rank etc. while studying the course for the first time.
  - Students must write codes to **solve real world problems** (esp. **story based questions** e.g.: *You are boarding a flight at 10 AM IST from New Delhi to California. If the flight takes 6 hours to reach California, at what US time will you land in California? Write a generic computer based application which helps solve a similar problem from any country A to any country B*).

- **Summer Terms**
  - During this period, generally the students are away from university and can utilize the time in their own way at their own pace.

  - This is the best time when the students can go for:
    - **Internships** – Give hands-on industry experience
    - **Certifications** – Industry acclaimed trainings and certifications exponentially boost employability potential of a student
    - **MOOCs** – Help a student study any course (which may or may not the part of his curriculum and discipline of study) at his/her own pace and flexible timings.
    - **International/National Level Contests and Hackathons** – Like Google Code Jam, TCS CodeVita, iTech Hackathon by ITC Infotech, etc. help student to practice hard problems and compete with the world outside the university/academia and face challenges/problems designed by hard-core professionals of the industry.
    - **Competitive programming Platforms** – During this time, students must **crack intermediate/advanced levels** of leading competitive programming platforms.

  - These activities might offer following **additional benefits** to the student subject to their level of achievement and relevance to the courses of the curriculum:
    - Waiver / exemption of a full relevant course in immediate next term
    - Waiver / exemption of one or more Academic Tasks of relevant course in next term
    - Reimbursement of MOOC certification fee by the university

Detailed Semester/Term Wise Plan

Term	Courses significant towards Placements taught by University as a part of Curriculum	University will enforce as part of curriculum over and above the conventions	Proposed Self-Development Activity to be done by student
1	Computer Programming (C)	Mini Project Programming Assignments on CodeChef Situation based Problem Solving.	Practice Mental/Vedic Maths. Solve Puzzles based problems. Setup your accounts in online programming contest platforms mentioned above. Write an individual project using C/C++
	Communication Skills–I		
2	Object Oriented Programming (C++)	BYOD Model (Everywhere Lab) Mini Project Programming Assignments on CodeChef Situation based Problem Solving.	
	Internet Programming Lab		
	Communication Skills–II		
Summer			**Option 1** Beginner level score in Prescribed Competitive Programming Environment (like Hackerrank, Hackerearth) **OR** Some hackathon / Intl. or Local competition *(may exempt one/two ATs exemption in DS and Algorithm course in next term)* Prescribed MOOCs on Python *(may waive you INT213 course; Student scoring more than 95% marks may get fee reimbursement from University)* Training / Certificate on Comp. HW and Troubleshooting *(may exempt one AT in CSE211)* **Option 2** Study a Foreign Language Students not having good Score in Programming courses shall pursue Basic Programming Workshop

Term	Courses significant towards Placements taught by University as a part of Curriculum	University will enforce as part of curriculum over and above the conventions	Proposed Self-Development Activity to be done by student
			Get training on any of the technologies as per your interest like: Web Design tools, PHP, Mobile Development Platforms like Android, iPhone Development, Data Analytics - R programming.
3	DBMS Data Structures Computer Architecture Python Programming Verbal Ability-I	BYOD Assessment through CodeChef Case / Situation Based problems Mini Project	Attempt Hacker Rank weekly challenges Go for an advanced course/certification on DBA from Oracle, MS SQL Create a web portal using Internet Technologies learnt during the term
4	Java Programming Computer Networks Operating Systems Software Engineering Soft Skill-I	BYOD	Solve puzzles based problems Go for a training on CCSP Implement OS Algorithms / Networking Protocols using Programming language of your choice (C/C++/Java). Write a project using Java to automate some tasks currently being done manually. Look to people around you for exploring ideas/avenues
Summer	4 / 6 Weeks Training: In-house / Outcampus	In-House training in some sort of Boot-camp mode	Get training on any of the technologies like: Web Design tools, Android, Php, iPhone Development, R Programming for Data Analytics, Ruby on Rails Competitive Programming (Moderate / Advanced Level) Certification Skills leading to Project Prescribed MOOCs Prize in prescribed Technical Events Write a team project for automating some routine real life tasks
5	Computer Graphics Artificial Intelligence		Solve Puzzles based problems.

Term	Courses significant towards Placements taught by University as a part of Curriculum	University will enforce as part of curriculum over and above the conventions	Proposed Self-Development Activity to be done by student
	SAP-I Elective: Course on Entrepreneurship/ Basic Law Analytical Skills-I Soft Skills-II	ONE Stream Elective from one of the following: Data Analytics Cyber Security Intelligent Systems IoT (Oracle) Big Data (Oracle) Web Tech. SEO /Digital Mktg (Google)	Optimize the algorithms and propose better versions. This will also boost research aptitude in students. Register for TCS Campus Commune Events (Codevita, Enginix, etc.) Google Code Jam, Amazon Hireon contest, Imagine Cup, etc.
6	Virtualization and Cloud (EMC2) SAP-II Information Security Analytical Skills-II Verbal Ability-II	TWO Stream Electives from one of the following: Data Analytics Cyber Security Intelligent Systems IoT (Oracle) Big Data (Oracle) Web Tech. SEO /Digital Mktg (Google)	
Summer	Non-credited PEP	Pre-placement preparatory workshops	Advanced Level Score in Prescribed Competitive Programming Environment *(may waive off Department Elective)* Prescribed MOOCs on courses mentioned in Department Elective-I of 7th semester *(Student scoring more than 95% marks may get fee reimbursement from University)* Register and Participate in National Level Hackathon iTech by ITC Infotech. Participate in Google Code Jam, Amazon Hireon contest, Imagine Cup, TCS Codevita, TCS Enginix, etc.
7	Mobile Computing Department Elective-I Non-credited PEP	ONE Stream Electives from one of the following:	Attempt weekly HackerRank challenges and Monthly Job challenge.

Term	Courses significant towards Placements taught by University as a part of Curriculum	University will enforce as part of curriculum over and above the conventions	Proposed Self-Development Activity to be done by student
		Data Analytics Cyber Security Intelligent Systems IoT (Oracle) Big Data (Oracle) Web Tech. SEO /Digital Mktg (Google)	Write a project using Java/.Net/Php that applies to some real world problem Participate in Google Code Jam, Amazon Hireon contest, Imagine Cup, TCS Codevita etc.
8	Full term Internship OR Capstone Project Department Elective-II Non-credited PEP		A project (LIVE) based on real life application (preferably involving latest technologies and diverse courses studied during all years of engineering).

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