



## **Regulations for B.Tech. in Computer Science and Social Sciences (CSSS) Program**

### **1. Preamble**

The B.Tech. program in Computer Science and Social Sciences (CSSS) is born out of a recognition that professionals of either discipline often realise in practice the methodological tools and the thinking apparatus needed to solve many important problems are to be found in the other discipline. This in turn can be a formidable barrier in the practice of their epistemic work.

With the growing convergence of information technology with social systems, the role that social sciences play in the development of technology and business solutions is also increasing. Symmetrically, the role that information technology plays in addressing social problems is also increasing. The value proposition of this program, therefore, is this complementarity. That is, students interested in pursuing Computer Science can do Computer Science better with a training in Social Sciences; and at the same time, students interested in Social Sciences can do Social Sciences better with a good training in Computer Science.

In B.Tech. CSSS, social sciences comprise of the following disciplines: economics, sociology/anthropology, psychology, and liberal arts, communication and humanities. Within the program, students are offered two broad options. One is to earn a major in one of the above disciplines in conjunction with computer science. The other is to opt for a portfolio of courses across all social science disciplines while taking the same set of computer science courses. The program structure is motivated by the fact that the skill-set required to address social problems can only be addressed through an integrated systems approach that requires strong synergies between computer science and social sciences. A training in this integrated program will open up several opportunities in the industry, social sector, governance, policy as well as for graduate school.

The program aims to develop capabilities in Computer Science as well as Social Science. At the end of the program, a student will have:

1. Understanding of foundations, limits, and capabilities of computing
2. Ability to design and implement efficient software solutions using suitable algorithms, data structures, and other computing techniques.
3. Understanding the foundations of social sciences and articulating the ways in which different social science disciplines enhance our understanding of society
4. Ability to use logical reasoning, theoretical perspectives and analytical methods, including modelling, data collection and evaluation for understanding issues from different social science perspectives.
5. Ability to synthesize concepts and methods from different social science disciplines and computing and apply these to address issues relating to society.

In addition, the graduate of this program will also have the following general skills that are common with other B.Tech. programs:

6. Ability to function effectively in teams to accomplish a common goal.
7. An understanding of professional and ethical responsibility.
8. Ability to communicate effectively with a wide range of audiences.
9. Ability to self-learn and engage in life-long learning.
10. Ability to undertake research tasks and projects.
11. Ability to take an idea and develop into a business plan for an entrepreneurial venture.
12. Understanding of the impact of solutions in an economic, societal, and environment context.

## 2. Program Structure

The B.Tech. program at IIT-D follows a philosophy of having a small set of core-courses, allowing students significant flexibility in designing their curriculum and specialization.

A. In the first few semesters mostly core courses are done. The structure for first few semesters is (courses mentioned in [ ] are electives and actual courses for these slots are as defined from semester to semester):

### For students of 2019 batch onwards

Semester 1	Semester 2	Semester 3	Semester 4	Semester 5
Introduction to Programming	Data Structures and Algorithms	Operating Systems	Algorithm Design and Analysis	
Digital Circuits	Introduction to Sociology/Anthropology	Research methods in Social Science and Design	Convex Optimization	
Maths I (Linear Algebra)	Maths II (Probability & Statistics)	Discrete Mathematics	Fundamentals of Database Management Systems	
Prototyping Interactive Systems	Computer Organization	Advanced Programming	Econometrics I	Technical communication + Environmental Sciences

Communication Skills	Critical thinking and Readings in Social Sciences	Maths III (Advanced Calculus)	[Human Computer Interaction/Graph Theory]	
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**For students of 2018 and previous batches**

Semester 1	Semester 2	Semester 3	Semester 4	Semester 5
Introduction to Programming	Data Structures and Algorithms	Computer Architecture and Operating Systems	Algorithm Design (B)	Computer Networks
Digital Circuits	Microeconomics	Introduction to Psychology	[LACH Elective]	
Maths I (Linear Algebra)	Maths II (Probability & Statistics)	Research methods in Social Science and Design	Database Management Systems	
Systems Management	Introduction to Engineering Design	Advanced Programming	[SS Elective]	Technical communication + Environmental Sciences
Communication Skills	Critical thinking and Readings in Social Sciences	Introduction to Sociology/Anthropology		

**Note:** The semester mentioned for the core courses is indicative and suggested, and they can be done later/earlier also. However, the pre-requisite requirements must be kept in mind by a student, if he/she wishes to do a core course in some other semester.

**B. List of Technical and Non-technical courses of first year**

For students of 2019 batch onwards

Semester	Technical Courses	Non-Technical Courses
<b>Semester 1</b>	Introduction to Programming Digital Circuits Maths I	Communication Skills

	Prototyping Interactive Systems	
<b>Semester 2</b>	Data Structures and Algorithms Introduction to Sociology and Anthropology Probability and Statistics Computer Organization Critical Thinking and Readings in Social Sciences	

- C. Rest of the program consists mostly of elective courses. An elective course is one which is not compulsory, and a student may have choices from which to select the courses he/she wants to do.
- D. Besides electives and streams for specialized areas, streams and electives from domain areas (e.g. health, life sciences, finance, economics, E-Governance, sciences, etc.) may also be offered as open electives.
- E. List of courses, and further information about the courses is available on the website: <https://www.iiitd.ac.in/academics/courses>
- F. Other requirements as specified later.

### **3. Requirements for Graduation**

For a B.Tech. (CSSS) degree, a student must satisfy all the following requirements:

1. Earn a total of 156 (inclusive of 2 credits each of SG/CW credits) credits (equivalent to 39 full courses – 21 courses in the first two years, and 18 courses in the last two years.)
2. Successfully complete all the core courses, and special electives (if specified).
3. Do 2 credits of Community Work and Self Growth each. These are pass/fail credits, which are required to be completed, and will count for fulfilling the credit requirements.
4. A student may take Online Courses. No more than 8 of these credits can count towards satisfying the credit requirements of the degree.

### **5. For 2019 batch onwards**

The students who choose to earn a major in economics will need to obtain at least 32 credits in this discipline (including Convex Optimization and Econometrics I). Of these 32 credits, 16 credits must be obtained from a predetermined list of compulsory courses. The remaining 16 credits are to be obtained from the list of economics electives.

OR

The students who choose to opt for a portfolio of courses across all social science disciplines should complete at least 28 credits of social science and humanities courses in the last four semesters. These courses are to be opted from the list of electives provided in the appendix, or as mandated by the SSH department.

AND

A student must complete at least 16 credits of Computer Science electives. B.Tech. Project /Independent Project/Independent Study/Undergraduate Research will not count towards this requirement. UGC may approve other relevant courses (e.g., from Math, ECE, Computational Biology, etc.) to be counted as CSE courses for this purpose. Online courses of the respective discipline (i.e., online courses with CSE course code), if done in the last four semesters will count towards this requirement.

#### **For 2018 and previous batches**

A student must complete at least 12 credits from Liberal Arts, Communications, and Humanities (LACH) group of courses.

AND

A student must complete at least 16 credits of Computer Science electives and at least 16 credits each in at least two Social Sciences Streams. The structure of streams is defined in Appendix. B.Tech. Project /Independent project/Independent study/Undergraduate Research will not count towards this requirement. UGC may approve some other relevant courses (e.g., Maths/CSE etc.) to be counted as CSE/SSH courses for this purpose. Online courses of the respective discipline (i.e. online courses with CSE/SSH course code), if done in the last four semesters will count towards this requirement.

6. A B.Tech. Project (BTP) is not compulsory for this program. A student opting for BTP, may take a total of 8 to 12 credits of BTP, spread over a minimum of 2 semesters, with no more than 8 credits in a semester. A student not completing BTP credits will have to forgo the partial BTP credits earned earlier and it will not be counted towards the credit requirement of 156 credits.
7. A student may take “Independent Project” or “Independent Study” or “Undergraduate Research” courses for 1, 2, or 4 credits in a semester. No more than 8 of these credits can count towards satisfying the credit requirements of the degree. Only students with satisfactory CGPA (at least 7.5) or with a strong interest in some area (the faculty advisor to determine this) and CGPA of at least 7.0 can take these courses. These and BTP credits do not count towards elective/stream credit requirements and are treated as open electives.

8. Rests of the credits are considered as “open electives” and the student can choose any courses from these.
9. A student can take maximum 2, 2xx level courses in 3rd and 4th year.

#### **4. Honors Program**

The B.Tech. (CSSS) program has the Honors option, requirements for which are same as specified in the regulations for the B.Tech. program namely;

1. The student must earn an additional 12 discipline credits (i.e. must complete at least 168 credits).
2. The student’s program must include a B.Tech. Project.
3. At graduation time, the student must have a CGPA of 8.0 or more.

#### **Appendix: Tentative list of Electives**

Tentative list of electives is given below. For Social Sciences, currently three streams are planned: economics, sociology/anthropology, psychology – each of them is defined below. Some courses in each stream are compulsory. Remaining courses can be done from other courses offered for that stream. If a course of the stream is included as a core course, it can be counted towards satisfying the credit requirement for the stream. The list of courses in each stream is indicative, and will evolve with time.

#### **Computer Science Electives**

The set of possible elective courses for computer science stream will be a subset of CSE courses that are regularly offered. These will likely include courses like HCI, Data Mining, Machine learning, Natural Language Processing, etc.

#### **Liberal Arts, Communications, and Humanities Group**

- Critical Thinking and Readings in Social Sciences (Compulsory)
- History of Information
- Perspectives on Knowledge
- Law and Ethics for the Information Society
- Social Informatics
- Introduction to Philosophy
- New Media Life
- Media in Society: Public Sphere Approach
- Applied Ethics
- Social and Political Philosophy
- Digital Ethics
- Theory and Practice of Engineering Ethics.

- Comparative Politics in the Digital Age
- Indian Political Thought
- New Media and Democracy
- Political Communication
- Science and Technology Policy: A comparative perspective
- Philosophy of Technology

### **Economics Stream (ECO)**

- Convex Optimization (Compulsory)
- Microeconomics I (Compulsory)
- Game Theory (Compulsory)
- Econometrics I (Compulsory)
- Macroeconomics
- Microeconomics II
- Econometrics II
- Market Design
- Industrial Organization
- Decision Theory
- Microeconometrics
- Spatial Statistics and Spatial Econometrics
- Political Economy
- Behavioral Economics
- Money and Banking
- Foundations of Finance
- Portfolio Valuation and Management

### **Sociology/Anthropology Stream (SOC)**

- Introduction to Sociology/Anthropology (Compulsory)
- Contemporary India: Sociological perspectives (Compulsory)
- Information Technology and Society (Compulsory)
- Sociology of New Media
- Urban Sociology
- Science, Technology and Society
- Gender, Technology and Society
- Gender and Media
- Sociological Theory
- Surveillance and Society
- Environment and Lifestyle
- AI and Society
- Digital Social Research
- User Experience Research: Qualitative Perspective
- Consumer Culture and Society
- ICTs for Development
- Social Network Analysis

## Psychology Stream (PSY) (This will be developed into Cognitive Psychology)

- Introduction to Psychology (Compulsory)
- Cognitive Psychology (Compulsory)
- Social psychology (Compulsory)
- Organizational Psychology
- Cultural psychology
- Media Psychology

### Note:

The scheduling of courses in semesters, as well as the list of elective courses is illustrative and will change with time.

### Change History

- **July 2017 release – Version 1**
- **January 2018 release – Minor changes**
- **July 2019 release**
  - (i) Counting of SG, CW credits in total credits. Applicable from 2017 batch onwards.
  - (ii) Total credits requirement for graduation and credit requirement for Honors students. Applicable from 2017 batch onwards.
  - (iii) Courses for Honors students. Applicable from 2017 batch onwards.
  - (iv) Discontinuation of BTP to IP conversion. Applicable from AY2019-20.
  - (v) Technical Courses
  - (vi) 2xx level courses
- **August 2019 release**
  - (i) Preamble
  - (ii) Program Structure, Pnt 2(A)
  - (iii) List of Technical and Non Technical Courses, Pnt 2(B)

For students of 2018 and previous batches

Semester	Technical Courses	Non-Technical Courses
<b>Semester 1</b>	Introduction to Programming Digital Circuits Maths I System Management	Communication Skills



<b>Semester 2</b>	Data Structures and Algorithms Microeconomics Probability and Statistics Introduction to Engineering Design Critical Thinking and Readings in Social Sciences	
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(iv) Requirement for graduation, Pnt 3(5,6)

(v) Appendix: List of Courses