INDRAPRASTHA INSTITUTE of INFORMATION TECHNOLOGY DELHI

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Regulations for B.Tech. in Computer Science and Economics (CSECON) Program

1. Preamble

Information technology and software technologies have greatly facilitated and changed the way markets function. For engineers to become entrepreneurs and product creators, they must understand the markets. Similarly, for a lot of problems that are of interest to the computer science community, economic reasoning is crucial. Economics provides immense potential for tangibly yielding socially-relevant research at IIITD, which is the institute's core vision for long-term growth.

The B. Tech. program in Computer Science and Economics at IIIT-Delhi aims to provide rigorous training in economics and computation that would prepare students for a professional career in industry, including banking, finance, consulting, software technology and IT services, as well as providing a thorough grounding for graduate level studies in both computer science and economics. The program has a set of core courses in both Computer Science, Economics and Mathematics, and a multitude of electives from both streams. The quantitative and computational orientation of this program enables an interface between IT and economics, both in theory and application.

This document specifies the specific regulations for the B.Tech. in Computer Science and Economics program – the general regulations for the B.Tech. program are given in a separate document.

Program Objectives:

1. Understanding the foundations of Computer Science and Economics and their interface.
2. Understanding the principles of computing and its various aspects.
3. Understanding the fundamental principles and tools to analyze markets and design them
4. Understanding the principles of data science for solving problems in economics and public policy.

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

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

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2. Program Structure

The B.Tech. program at IIIT-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 the first four semesters is

Semester 1	**Semester 2**	**Semester 3**	**Semester 4**	**Semester 5**	**Semester 6 onwards**
Introduction to Programming	Data Structures and Algorithms	Operating Systems	Algorithm Design and Analysis	Game Theory	*[Special Elective - Bucket I]*
Digital Circuits	Principles of Economics	Macroeconomics	Convex Optimization	Econometrics II	*[Special Elective - Bucket II]*
Maths-I (Linear Algebra)	Maths-II (Probability and Statistics)	Discrete Mathematics	Database Management Systems		

Introduction to HCI	Computer Organization	Advanced Programming	Econometrics I	Technical Communication+ Environmental Sciences	
Communication Skills	SSH Elective	Math-III (Multivariate Calculus)	Microeconomics		

Note: Special Electives mentioned in [] can be done any semester. However, the prerequisites for the courses must be met first.

Students must do at least one course from each special elective bucket, defined as follows:

Bucket 1:

1. Industrial Organization.
2. Contract Theory.
3. Mechanism Design.
4. Behavioral Economics.

Bucket 2:

1. Causal Inference
2. Econometrics with Machine Learning
3. Economics and Social Networks
4. Spatial Statistics and Spatial Econometrics
5. Markov Decision Processes
6. Mathematical Finance

The list of courses in buckets I and II may be updated as needed. Economics electives that are not in bucket I and II are listed at the end of the document.

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

Semester	**Technical Courses**	**Non-Technical Courses**
Semester 1	Introduction to Programming Digital Circuits Maths I Introduction to HCI	Communication Skills

Semester 2	Data Structures and Algorithms Computer Organization Probability and Statistics Principles of Economics	SSH Elective

C. Other requirements as specified later.

3. Requirements for Graduation

For a B.Tech. (CSECON) 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 of 4 credits each).

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 subject to prior approval from the Department. No more than 8 of these credits can count towards satisfying the credit requirements of the degree.

5. In the last four semesters, a student must complete at least 32 credits of Econ/CSE courses, which should include at least 12 credits of CSE and 12 credits of Econ courses (out of which at least 1 economics course has to come from bucket 1 and at least one from bucket 2). These 32 credits should come from 3xx or above level courses and should be different from the core courses. AAC may approve other relevant courses (e.g. ECE, Mathematics, Computational Biology, etc.) to be counted as CSE/ECO courses for this purpose. Online courses of the respective discipline (i.e. online courses with CSE or ECO course code) can be counted if approved by the department.

6. A B.Tech. Project (BTP) is optional and can be started any time after the 2nd Year. 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.

   Note: A BTP has to span at least over 2 regular consecutive semesters (i.e., Monsoon and Winter) and can span at most 3 consecutive semesters. However, in the case of a gap due to semester leave, the student will be allowed to continue the BTP with the consent of the advisor.

   A detailed document on the guidelines and processes to complete the BTP is available on this link.

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.

8. Rest 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. (CSECON) 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). At least 4 of these 12 credits should come from Special Elective Buckets I and II (page 3 of the document)
2. The student’s program must include a B.Tech. Project.
3. At the time of graduation, the student must have a CGPA of 8.0 or more.

Appendix: Tentative list of Electives

Tentative list of electives is given below.

Computer Science Electives

The set of possible elective courses for computer science stream will be a subset of CSE courses that are regularly offered.

Economics Electives

- Decision Theory
- Development Economics
- Financial Economics
- Foundations of Finance
- Microeconometrics
- Money and Banking
- Macroeconomic theory
- Macroeconomic DSGE models
- Market Design
- Public Finance
- Valuation and Portfolio Management

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