

Double Major in the Department of Computer Science and Engineering (CSE) / Data Science and Artificial Intelligence (DSAI) / Electronics and Communication Engineering (ECE)

Objective:

The Double Major Program is designed to provide students from other departments with the opportunity to gain expertise in an additional discipline. This interdisciplinary program equips students with a broader skill set, enhancing their career prospects by combining knowledge from both their primary Major and the Double Major.

Committee Formation:

A department-level committee, comprising faculty members from CSE, DSAI, and ECE, has been established to ensure that the Double Major Program aligns with the department's and institute's objectives.

Program Overview:

The Double Major allows students from other departments to pursue a second Major in CSE, DSAI, or ECE. This program provides in-depth learning in the selected discipline, enabling students to build a strong foundation in both their primary and secondary fields of study.

Requirements:

- **Duration:** The Double Major must be completed within 5 years (4+1 years) of the B.Tech program.
- **Coursework:** Students will follow a prescribed set of core and elective courses from the chosen department. If any courses overlap with their primary Major, equivalent elective courses will be substituted.
- **Credits:** The Double Major requires 32 additional credits, separate from the student's primary Major.
- **Course Credit:** Courses cannot be double-counted for the B.Tech degree, Minor, and Double Major.

Common Credit Structure (Applicable to All Double Majors):

| Sl. No. | Course Type | Minimum Credits Requirement |
|---------|---------------------------------|-----------------------------|
| 1 | Core Courses Basket | 20 |
| 2 | Elective Basket/Projects | 12 |
| | Total | 32 |

Entry Conditions:

- **Eligibility:** Students can apply for a Double Major **after the second semester**, provided they have a CGPA of 8.0 or higher.
- **Application Process:** Applications are accepted immediately after the **second semester** results are announced, with a formal call for entries sent via email.
- **Intake:** Seats for the Double Major will be limited to 25% of the department's B.Tech intake. If applications exceed the available seats, selection will be based on the CGPA from the first semester.

Exit Options:

- **Incomplete Credits:** If a student is unable to complete all 32 credits, they may opt for a Minor (16 credits) in the discipline, with the additional completed courses recorded as "Additional Learning Courses" on the transcript.

Sliding from Minor to Double Major:

- Students pursuing a Minor may request for sliding **up to the end of 5th semester**.
- To transition (slide) from a Minor to a Double Major, the student must maintain a minimum CGPA of 8.0. at any point during their academic program.
- The request for the sliding, from Minor to Double Major, from a student will be considered upon the recommendation of DUGC.
- Upon sliding to a Double Major, the courses already completed as part of the Minor will be mapped towards the 32-credit course requirements for the Double Major (this includes a minimum of 20 credits from the core courses, with the remaining 12 credits from elective courses). After this mapping, the student will need to complete the remaining respective credits from both core and elective course baskets.
- For example, if 4 credits from the Minor are applicable to the core courses of the Double Major, the student must complete an additional 16 credits from the core course basket. The remaining courses from the Minor will be counted towards electives.

- If the student completes 32 credits, they will be awarded a Double Major. If not, they may still receive the Minor degree along with the additional completed courses.

Double Major in Department of Computer Science and Engineering (CSE)

To establish a structured approach to the Double Major Program initiative in CSE at IIIT Dharwad, a department level committee was formed with the objective of creating programs that reflect the institute's culture.

The committee includes all faculty of Department of CSE, IIIT Dharwad:

1. Dr. Pramod Yelmewad, Assistant Professor
2. Dr. Krishnendu Ghosh, Assistant Professor
3. Dr. Abdul Wahid, Assistant Professor
4. Dr. Animesh Roy, Assistant Professor
5. Dr. Suvadip Hazra, Assistant Professor
6. Dr. Vivekraj V K, Assistant Professor
7. Dr. Pavan Kumar C, Assistant Professor
8. Dr. Malay Kumar, Assistant Professor
9. Dr. Sunil C K, Assistant Professor
10. Dr. Dibyajyoti Guha, Assistant Professor
11. Dr. Sunil Kumar P V, Assistant Professor
12. Dr. Girish G N, Assistant Professor
13. Dr. C B Akki, Professor
14. Dr. Prabhu Prasad B M, Assistant Professor and Head

A Double Major in Computer Science and Engineering allows students from other departments, such as DSAI and ECE, to pursue a major in CSE. This program equips them with in-depth knowledge and skills with respect to core Computer science concepts equipping them with a significant advantage in the tech-driven job market. Combining a major in Computer Science and Engineering (CSE) with a regular BTech course offers several advantages such as industry-relevant skills, broader career opportunities, interdisciplinary learning, innovation and entrepreneurship, research and higher studies.

Requirements:

1. **Duration:** The Double Major must be completed within the maximum duration of the B.Tech program (typically 4+1 years).
2. **Coursework:** Students will follow a structured course template for the CSE Double Major, including core and elective courses from B.Tech in CSE.
3. If any core courses overlap with the student's primary Major, these will be replaced with other core/elective courses of equivalent credit value from the CSE program.
4. A total of 32 credits must be earned through CSE core and elective courses. These credits are separate from the requirements for the student's primary Major.

The following curriculum for obtaining CSE as the additional Double Major is applicable for students in non-CSE departments who started their B Tech in the Aug 2024 semester or later.

Core Course Basket: Minimum 20 credit

| CSE Core Course Baskets (Minimum 20 credits) | | |
|--|---------------------------------------|-----------|
| Sl. No | Course | Credits |
| 1 | Mathematical foundations of Computing | 3 |
| 2 | Operating systems | 2 |
| 3 | Systems and usable security | 2 |
| 4 | Computer Networks | 4 |
| 5 | Software design tools and techniques | 3 |
| 6 | Design & Analysis of Algorithms | 4 |
| 7 | Software engineering | 2 |
| 8 | DBMS | 4 |
| 9 | Artificial Intelligence | 4 |
| 11 | Theory of Computing | 4 |
| | Total credits | 32 |

Elective Course Basket: Minimum 12 credits

| Indicative list of Discipline electives | | | |
|---|--------------------------------------|-------|---------------------------------------|
| sl.no | Course | sl.no | Course |
| 1 | Machine learning | 13 | Virtualization and Cloud Computing |
| 2 | Deep learning | 14 | AI for Cybersecurity |
| 3 | Computer Graphics | 15 | Information theory |
| 4 | Image Processing and Computer Vision | 16 | Cryptography and Information Security |
| 5 | Human computer interaction | 17 | Graph theory |
| 6 | Deep Computer Vision | 18 | Model checking |
| 7 | Bioinformatics | 19 | Advanced Algorithm Design |
| 8 | Generative AI | 20 | Compiler design |

| | | | |
|---|-----------------------------|----|--------------------------------|
| 9 | Natural Language Processing | 21 | Advanced computer architecture |
| 10 | Information Retrieval | 22 | RTOS |
| 11 | Parallel Computing | | |
| 12 | DevOps | | |
| List is only indicative and may be upgraded as and when expertise becomes available. | | | |

Entry Conditions:

- **Eligibility:** Students can apply for a Double Major **after the second semester**, provided they have a CGPA of 8.0 or higher.
- **Application Process:** Applications are accepted immediately after the **second semester** results are announced, with a formal call for entries sent via email.
- **Intake:** Seats for the Double Major will be limited to 25% of the department's B.Tech intake. If applications exceed the available seats, selection will be based on the CGPA from the first semester.

Exit Options:

- **Incomplete Credits:** If a student is unable to complete all 32 credits, they may opt for a Minor (16 credits) in the discipline, with the additional completed courses recorded as "Additional Learning Courses" on the transcript.

Sliding from Minor to Double Major:

- **Students pursuing a Minor are required to complete at least 16 credits.**
- Students may request for sliding **up to the end of 5th semester**.
- To transition (slide) from a Minor to a Double Major, the student must maintain a minimum CGPA of 8.0. at any point during their academic program.
- The request for the sliding, from Minor to Double Major, from a student will be considered upon the recommendation of DUGC.
- Upon sliding to a Double Major, the courses already completed as part of the Minor will be mapped towards the 32-credit course requirements for the Double Major (this includes a minimum of 20 credits from the core courses, with the remaining 12 credits from elective courses). After this mapping, the student will need to complete the remaining respective credits from both core and elective course baskets.
- For example, if 4 credits from the Minor are applicable to the core courses of the Double Major, the student must complete an additional 16 credits from the core course basket. The remaining courses from the Minor will be counted towards electives.
- If the student completes 32 credits, they will be awarded a Double Major. If not, they may still receive the Minor degree along with the additional completed courses.

Double Major in Department of Data Science and Artificial Intelligence (DSAI)

To establish a structured approach to the Double Major Program initiative in DSAI at IIIT Dharwad, a department level committee was formed with the objective of creating programs that reflect the institute's culture.

The committee includes all faculty of Department of DSAI, IIIT Dharwad:

1. Dr. Ramesh Athé, Assistant Professor
2. Dr. Manjunath K V, Assistant Professor
3. Dr. Utkarsh Khaire, Assistant Professor
4. Dr. Animesh Chaturvedi, Assistant Professor
5. Dr. Shirshendu Layek, Assistant Professor
6. Dr. Siddharth R, Assistant Professor
7. Dr. Rajendra Hegadi, Associate Professor
8. Dr. Sunil Saumya, Assistant Professor and Head
9. Prof. S. R. Mahadeva Prasanna, Professor and Director

A Double Major in Data Science and Artificial Intelligence (DSAI) allows students from other departments, such as CSE and ECE, to pursue a second Major in DSAI. This program equips them with in-depth knowledge and skills in AI, machine learning, and data science, giving them a significant advantage in the tech-driven job market. By combining expertise from their primary Major with DSAI, students gain interdisciplinary knowledge, expanding their career opportunities in fields like AI research and data science. This flexibility enhances their employability, as they become highly sought after by employers seeking professionals skilled in both core technical areas and AI-driven applications, making them ideal candidates for careers such as machine learning engineers, data scientists, data analysts or domain-specific AI specialists.

Requirements:

1. **Duration:** The Double Major must be completed within the maximum duration of the B.Tech program (typically 4+1 years).
2. **Coursework:** Students will follow a structured course template for the DSAI Double Major, including core and elective courses from B.Tech in Data Science and AI.
3. If any core courses overlap with the student's primary Major, these will be replaced with other core/elective courses of equivalent credit value from the DSAI program.

4. A total of 32 credits must be earned through DSAI core and elective courses. These credits are separate from the requirements for the student's primary Major.

The following curriculum for obtaining DSAI as the additional Double Major is applicable for students in non-DSAI departments who started their B Tech in the Aug 2024 semester or later.

Core Course Basket: Minimum 20 credit

| DSAI Core Course Baskets (Minimum 20 credits) | | |
|---|-------------------------------------|-----------|
| Sl. No. | Courses | Credits |
| 1 | Data Curation Techniques | 3 |
| 2 | Statistical Programming | 2 |
| 3 | Data Handling and Visualization | 3 |
| 4 | Database Management and Warehousing | 4 |
| 5 | Information Security and Privacy | 4 |
| 6 | Artificial Intelligence | 4 |
| 7 | Machine Learning | 4 |
| 8 | Big Data Analytics | 4 |
| 9 | Deep Learning | 4 |
| Total Credit | | 32 |

Elective Course Basket: Minimum 12 credits

| S. no. | Courses | S. no. | Courses |
|--------|-----------------------------------|--------|-----------------------------------|
| 1 | Financial Data Analytics | 11 | Bioinformatics |
| 2 | Numerical Methods in Finance | 12 | Healthcare Data Analytics |
| 3 | Computational Financial Modelling | 13 | Computational Biology |
| 4 | Cloud Computing | 14 | Biomedical Image and Signal Proc. |
| 5 | Time-series Analysis | 15 | Human-Computer Interaction |
| 6 | Internet of Things | 16 | Advanced Deep Learning |
| 7 | AI Systems SDLC | 17 | Generative AI |

| | | | |
|---|---|----|------------------------|
| 8 | Distributed AI Systems | 18 | Deep Speech Processing |
| 9 | Signal Processing for Data Science and Machine Learning | 19 | Reinforcement Learning |
| 10 | Systems Engineering Approaches to AI | 20 | Large Language Models |
| List is only indicative and may be upgraded as and when expertise becomes available. | | | |

Entry Conditions:

- **Eligibility:** Students can apply for a Double Major **after the second semester**, provided they have a CGPA of 8.0 or higher.
- **Application Process:** Applications are accepted immediately after the **second semester** results are announced, with a formal call for entries sent via email.
- **Intake:** Seats for the Double Major will be limited to 25% of the department's B.Tech intake. If applications exceed the available seats, selection will be based on the CGPA from the first semester.

Exit Options:

- **Incomplete Credits:** If a student is unable to complete all 32 credits, they may opt for a Minor (16 credits) in the discipline, with the additional completed courses recorded as "Additional Learning Courses" on the transcript.

Sliding from Minor to Double Major:

- **Students pursuing a Minor are required to complete at least 16 credits.**
- Students may request for sliding **up to the end of 5th semester**.
- To transition (slide) from a Minor to a Double Major, the student must maintain a minimum CGPA of 8.0. at any point during their academic program.
- The request for the sliding, from Minor to Double Major, from a student will be considered upon the recommendation of DUGC.
- Upon sliding to a Double Major, the courses already completed as part of the Minor will be mapped towards the 32-credit course requirements for the Double Major (this includes a minimum of 20 credits from the core courses, with the remaining 12 credits from elective courses). After this mapping, the student will need to complete the remaining respective credits from both core and elective course baskets.
- For example, if 4 credits from the Minor are applicable to the core courses of the Double Major, the student must complete an additional 16 credits from the core course basket. The remaining courses from the Minor will be counted towards electives.
- If the student completes 32 credits, they will be awarded a Double Major. If not, they may still receive the Minor degree along with the additional completed courses.

Double Major in Department of Electronics and Communication Engineering (ECE)

To establish a structured approach to the Double Major Program initiative in ECE at IIIT Dharwad, a department level committee was formed with the objective of creating programs that reflect the institute's culture.

The committee includes all faculty of Department of ECE, IIIT Dharwad:

1. Dr. Chinmayananda A, Assistant Professor
2. Dr. Deepak K T, Assistant Professor
3. Dr. Jagadeesha R B, Assistant Professor
4. Dr. Jagadish D N, Assistant Professor
5. Dr. Nataraj K S, Assistant Professor
6. Dr. Prakash Pawar, Assistant Professor and Head
7. Dr. Rajib Sharma, Assistant Professor
8. Dr. Sibasankar Padhy, Assistant Professor
9. Dr. Somen Bhattacharjee, Assistant Professor

A Double Major in Electronics and Communication Engineering(ECE) allows students from other departments, such as CSE and DSAI, to pursue a major in ECE. This program equips them with in-depth knowledge and skills in Electronics, Communications, Embedded Systems, and VLSI giving them a significant advantage in the tech-driven job market. By combining expertise from their primary major with ECE, students gain interdisciplinary knowledge, expanding their career opportunities in fields like Signal Processing, VLSI, IoT and related domains. This flexibility enhances their employability, as they become highly sought after by employers seeking professionals skilled in both core technical areas and Electronics-driven domain, making them ideal candidates for careers such as Design Engineers in VLSI, Embedded and Signal Processing domains.

Requirements:

1. **Duration:** The Double Major must be completed within the maximum duration of the B.Tech program (typically 4+1 years).
2. **Coursework:** Students will follow a structured course template for the ECE Double Major, including core and elective courses from B.Tech in Electronics and Communication Engineering.
3. If any core courses overlap with the student's primary Major, these will be replaced with other core/elective courses of equivalent credit value from the ECE program.

4. A total of 32 credits must be earned through ECE core and elective courses. These credits are separate from the requirements for the student's primary Major.

The following curriculum for obtaining ECE as the additional Double Major is applicable for students in non-DSAI departments who started their B.Tech in the Aug 2024 semester or later.

Core Course Basket: Minimum 20 credit

| ECE Core Course Baskets (Minimum 20 credits) | | | |
|--|--|-----------|-----|
| Sl. No. | Courses | Credits | Sem |
| 1 | Network Analysis | 3 | II |
| 2 | Random Process | 2 | III |
| 3 | Signals & Systems | 3 | III |
| 4 | Semiconductor Devices | 2 | IV |
| 5 | Analog Electronics Circuits | 2 | IV |
| 6 | Machine Learning/Any ECE Discipline Elective | 4 | IV |
| 7 | Analog and Digital Communication | 3 | IV |
| 8 | Introduction to VLSI Design | 4 | V |
| 9 | Digital Signal Processing | 2 | V |
| 10 | Control System | 2 | VI |
| 11 | Linear Integrated Circuits | 2 | VI |
| 12 | Embedded System Design | 3 | VI |
| | Total Credit | 32 | |

Elective Course Basket: Minimum 12 credits

| S. no. | Courses | S. no. | Courses |
|---|----------------------------------|--------|--|
| 1 | Analog & Mixed Signal Design | 15 | Advanced Embedded Systems |
| 2 | RF IC Design | 16 | Real Time Systems |
| 3 | Digital System Design | 17 | Embedded AI |
| 4 | System on Chip (SoC) | 18 | DSP Processors |
| 5 | Low Power VLSI Design | 19 | Hardware-Software Co-Design |
| 6 | VLSI Testing & Verification | 20 | Robotics |
| 7 | Memory Design and Testing | 21 | State space Approach to Control System Analysis and Design |
| 8 | Electromagnetic Field and Waves | 22 | Biomedical Signal & Image Processing |
| 9 | Antenna & Microwave Engineering | 23 | Statistical Signal Processing |
| 10 | Wireless Communication | 24 | Speech Processing |
| 11 | 5G and Beyond Systems | 25 | Deep Learning |
| 12 | Wireless Networks | 26 | Reinforcement Learning |
| 13 | Information Theory Coding | 27 | Advanced DSP |
| | Software Defined Network | 28 | Statistical Signal Processing |
| 14 | Queueing Theory and Applications | 29 | Detection and Estimation Theory |
| 15 | Optical Communication | 30 | Image Processing/Video Processing/Computer Vision |
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Entry Conditions:

- **Eligibility:** Students can apply for a Double Major after the second semester, provided they have a CGPA of 8.0 or higher.
- **Application Process:** Applications are accepted immediately after the second semester results are announced, with a formal call for entries sent via email.

- **Intake:** Seats for the Double Major will be limited to 25% of the department's B.Tech intake. If applications exceed the available seats, selection will be based on the CGPA from the first semester.

Exit Options:

- **Incomplete Credits:** If a student is unable to complete all 32 credits, they may opt for a Minor (16 credits) in the discipline, with the additional completed courses recorded as "Additional Learning Courses" on the transcript.

Sliding from Minor to Double Major:

- **Students pursuing a Minor are required to complete at least 16 credits.**
- Students may request for sliding up to the end of 5th semester.
- To transition (slide) from a Minor to a Double Major, the student must maintain a minimum CGPA of 8.0. at any point during their academic program.
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- If the student completes 32 credits, they will be awarded a Double Major. If not, they may still receive the Minor degree along with the additional completed courses.