# D Y Patil College of Engineering & Technology, Kasaba Bawada, Kolhapur.
## Department of Computer Science & Engineering.
## Curriculum Structure for B. Tech in CSE (Data Science)

**Second Year B. Tech. Program in Computer Science & Engineering(DS), Semester – III**

| Sr. No | Course Code | Course Type | Name of the Course | Teaching Scheme Per Week | | | Credits | Total Marks | Evaluation Scheme | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Lecture Hours | Tutorial Hours | Practical Hours | | | Type | Max. Marks | Min. Marks for Passing | |
| 1 | 201DSL201 | BSC | Linear Algebra | 3 | - | - | 3 | 100 | **ISE** | 20 | 20 | 40 |
| | | | | | | | | | **MSE** | 30 | | |
| | | | | | | | | | **ESE** | 50 | 20 | |
| 2 | 201DSL202 | BSC | Discrete Mathamatics and Social Graphs | 3 | 1 | - | 4 | 100 | **ISE** | 20 | 20 | 40 |
| | | | | | | | | | **MSE** | 30 | | |
| | | | | | | | | | **ESE** | 50 | 20 | |
| 3 | 201DSL203 | ESC | Structured Computer Organization and Microprocessors | 3 | - | - | 3 | 100 | **ISE** | 20 | 20 | 40 |
| | | | | | | | | | **MSE** | 30 | | |
| | | | | | | | | | **ESE** | 50 | 20 | |
| 4 | 201DSL204 | PCC | Data Structures | 3 | - | - | 3 | 100 | **ISE** | 20 | 20 | 40 |
| | | | | | | | | | **MSE** | 30 | | |
| | | | | | | | | | **ESE** | 50 | 20 | |
| 5 | 201DSL205 | PCC | Fundamentals of Networking | 3 | - | - | 3 | 100 | **ISE** | 20 | 20 | 40 |
| | | | | | | | | | **MSE** | 30 | | |
| | | | | | | | | | **ESE** | 50 | 20 | |
| 6 | 201DSP206 | PCC | Python Programming Laboratory | 2 | - | 2 | 3 | 50 | **ISE** | 25 | 10 | 20 |
| | | | | | | | | | **ESE-POE** | 25 | 10 | |
| 7 | 201DSP207 | PCC | Data Structures Laboratory | - | - | 2 | 1 | 75 | **ISE** | 25 | 10 | 30 |
| | | | | | | | | | **ESE-POE** | 50 | 20 | |
| 8 | 201DSP208 | PCC | Networking Laboratory | - | - | 2 | 1 | 25 | **ISE** | 25 | 10 | 10 |
| 9 | 201DSP209 | HMCS | Soft Skills Laboratory | - | - | 2 | 1 | 50 | **ISE** | 25 | 10 | 20 |
| | | | | | | | | | **ESE-OE** | 25 | 10 | |
| Total | | | | 17 | 1 | 8 | 22 | 700 | - | - | - | 280 |
| | | | | **26** | | | | | | | | |

***ISE: In Semester Evaluation*** ***MSE: Mid Semester Examinati*** ***ESE: End Semester Examination***

**Note 1 : Tutorials and practical shall be conducted in batches with batch strength not exceeding 20 students.**

**Note 2 : ESE will be conducted for 100 marks and converted to 50 marks**

## Second Year B. Tech. Program in Computer Science & Engineering(DS), Semester – IV

| Sr. No | Course Code | Course Type | Name of the Course | Teaching Scheme Per Week | | | Credits | Total Marks | Evaluation Scheme | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Lecture Hours | Tutorial Hours | Practical Hours | | | Type | Max. Marks | Min. Marks for Passing | |
| 1 | 201DSL210 | BSC | Probability and Statistics | 3 | 1 | - | 4 | 100 | **ISE** | 20 | 20 | 40 |
| | | | | | | | | | **MSE** | 30 | | |
| | | | | | | | | | **ESE** | 50 | 20 | |
| 2 | 201DSL211 | PCC | Operating Systems | 3 | - | - | 3 | 100 | **ISE** | 20 | 20 | 40 |
| | | | | | | | | | **MSE** | 30 | | |
| | | | | | | | | | **ESE** | 50 | 20 | |
| 3 | 201DSL212 | PCC | Computer Algorithms | 3 | - | - | 3 | 100 | **ISE** | 20 | 20 | 40 |
| | | | | | | | | | **MSE** | 30 | | |
| | | | | | | | | | **ESE** | 50 | 20 | |
| 4 | 201DSL213 | PCC | Fundamentals of Data Science | 3 | | - | 3 | 100 | **ISE** | 20 | 20 | 40 |
| | | | | | | | | | **MSE** | 30 | | |
| | | | | | | | | | **ESE** | 50 | 20 | |
| 5 | 201DSL214 | PCC | Theory of Computations | 3 | - | - | 3 | 100 | **ISE** | 20 | 20 | 40 |
| | | | | | | | | | **MSE** | 30 | | |
| | | | | | | | | | **ESE** | 50 | 20 | |
| 6 | 201DSP215 | PCC | R Programming Laboratory | 2 | - | 2 | 3 | 50 | **ISE** | **25** | 20 | 20 |
| | | | | | | | | | **ESE-POE** | 25 | | |
| 8 | 201DSP216 | PCC | Data Science Laboratory | - | - | 2 | 1 | 50 | **ISE** | 25 | 10 | 20 |
| | | | | | | | | | **ESE-POE** | 25 | 10 | |
| 9 | 201DSP217 | PROJ | Project-I | - | - | 2 | 1 | 50 | **ISE** | 25 | 10 | 20 |
| | | | | | | | | | **ESE-POE** | 25 | 10 | |
| 10 | 201DSMC218 | MC | Environmental Studies (Mandatory Course-I) | 2 | - | - | - | 50 | **ESE** | 50 | 20 | 20 |
| Total | | | | 19 | 1 | 6 | 21 | 700 | - | - | - | 280 |
| | | | | **26** | | | | | | | | |

***ISE: In Semester Evaluation*** ***MSE: Mid Semester Examination*** ***ESE: End Semester Examination***

**Note 1 : Tutorials and practical shall be conducted in batches with batch strength not exceeding 20 students.**
**Note 2 : ESE will be conducted for 100 marks and converted to 50 marks**

***** 4 to 6 week internship mandatory in summer vacation of SEM-IV or SEM-VI (Credits will be considered in VII semester)**

# Summer Internship

The students are expected to undergo **4 to 6 weeks Internship** in the industry and work on the relevant area as assigned by the Industry. The work done should be monitored and evaluated by the concerned industry expert based on the report prepared by the student. The department has to assign faculty mentors to a student who has to communicate with the industry and monitor the entire internship related work periodically.

The scheme of evaluation will be as under:-

**a) Industry expert/ supervisor: - 70%**

**b) Department & Faculty mentor: - 30%** Faculty mentor includes "Presentation and Submission of Report", to the Department at the beginning of the subsequent semester.

1) The Internship can be availed by the students during the summer vacations after completion of semester IV or VI.

2) The Credit of the Internship will be considered in semester VII.

3) The Industry experts/ supervisor are expected to assign the work worth minimum 100 to 120 hours for 4 weeks duration and should monitor and evaluate periodically.

4) At the completion of Internship work, the student is expected to prepare a report on the work done and get it certified from the industry expert.

## Third Year B. Tech. Program in Computer Science & Engineering (DS), Semester – V

| Sr. No | Course Code | Course Type | Name of the Course | Teaching Scheme Per Week | | | Credits | Total Marks | Evaluation Scheme | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Lecture Hours | Tutorial Hours | Practical Hours | | | Type | Max. Marks | Min. Marks for Passing | |
| 1 | 201DSL301 | PCC | System Programming and Compilers. | 3 | - | - | 3 | 100 | **ISE** | 20 | 20 | 40 |
| | | | | | | | | | **MSE** | 30 | | |
| | | | | | | | | | **ESE** | 50 | 20 | |
| 2 | 201DSL302 | PCC | Exploratory Data Analysis and Visualization. | 3 | - | - | 3 | 100 | **ISE** | 20 | 20 | 40 |
| | | | | | | | | | **MSE** | 30 | | |
| | | | | | | | | | **ESE** | 50 | 20 | |
| 3 | 201DSL303 | PCC | Introduction to Machine Learning | 3 | - | - | 3 | 100 | **ISE** | 20 | 20 | 40 |
| | | | | | | | | | **MSE** | 30 | | |
| | | | | | | | | | **ESE** | 50 | 20 | |
| 4 | 201DSL304 | PCC | Database Engineering | 3 | - | - | 3 | 100 | **ISE** | 20 | 20 | 40 |
| | | | | | | | | | **MSE** | 30 | | |
| | | | | | | | | | **ESE** | 50 | 20 | |
| 5 | 201DSL305 | ESC | Software Engineering | 3 | - | - | 3 | 100 | **ISE** | 20 | 20 | 40 |
| | | | | | | | | | **MSE** | 30 | | |
| | | | | | | | | | **ESE** | 50 | 20 | |
| 6 | 201DSP306 | PCC | Java Programming | 2 | - | 2 | 3 | 50 | **ISE** | 25 | 20 | 20 |
| | | | | | | | | | **ESE-POE** | 25 | | |
| 7 | 201DSP307 | PCC | EDA and Visualization Laboratory | - | - | 2 | 1 | 50 | **ISE** | 25 | 10 | 20 |
| | | | | | | | | | **ESE-POE** | 25 | 10 | |
| 8 | 201DSP308 | PCC | Machine Learning Laboratory | - | - | 2 | 1 | 25 | **ISE** | 25 | 10 | 10 |
| 9 | 201DSP309 | PCC | Database Engineering Laboratory | - | - | 2 | 1 | 50 | **ISE** | 25 | 10 | 20 |
| | | | | | | | | | **ESE -POE** | 25 | 10 | |
| 10 | 201DSMC310 | MC | Economics and Management for IT (Mandatory Course-II) | 2 | - | - | - | 50 | **ESE** | 50 | 20 | 20 |
| Total | | | | 19 | 0 | 8 | 21 | 725 | - | - | - | 290 |
| | | | | **27** | | | | | | | | |

***ISE: In Semester Evaluation*** ***MSE:Mid Semester Examination*** ***ESE: End Semester Examination***

**Note 1 : Tutorials and practical shall be conducted in batches with batch strength not exceeding 15 students.**

**Note 2 : ESE will be conducted for 100 marks and converted to 50 marks**

## Third Year B. Tech. Program in Computer Science & Engineering (DS), Semester – VI

| Sr. No | Course Code | Course Type | Name of the Course | Teaching Scheme Per Week | | | Credits | Total Marks | Evaluation Scheme | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Lecture Hours | Tutorial Hours | Practical Hours | | | Type | Max. Marks | Min. Marks for Passing | |
| 1 | 201DSL311 | PCC | Advanced Database Systems | 3 | - | - | 3 | 100 | **ISE** | 20 | 20 | 40 |
| | | | | | | | | | **MSE** | 30 | | |
| | | | | | | | | | **ESE** | 50 | 20 | |
| 2 | 201DSL312 | PCC | Optimization for Data Science | 3 | - | - | 3 | 100 | **ISE** | 20 | 20 | 40 |
| | | | | | | | | | **MSE** | 30 | | |
| | | | | | | | | | **ESE** | 50 | 20 | |
| 3 | 201DSL313 | PCC | Information Security | 3 | - | - | 3 | 100 | **ISE** | 20 | 20 | 40 |
| | | | | | | | | | **MSE** | 30 | | |
| | | | | | | | | | **ESE** | 50 | 20 | |
| 4 | 201DSL314 | PEC | Professional Elective-I | 3 | 1 | - | 4 | 100 | **ISE** | 20 | 20 | 40 |
| | | | | | | | | | **MSE** | 30 | | |
| | | | | | | | | | **ESE** | 50 | 20 | |
| 5 | 201DSL315 | OEC | Open Elective-I | 3 | - | - | 3 | 100 | **ISE** | 20 | 20 | 40 |
| | | | | | | | | | **MSE** | 30 | | |
| | | | | | | | | | **ESE** | 50 | 20 | |
| 6 | 201DSP316 | PCC | Advanced Database System Laboratory | | | 2 | 1 | 75 | **ISE** | 25 | 10 | 30 |
| | | | | | | | | | **ESE-POE** | 50 | 20 | |
| 7 | 201DSP317 | PROJ | Project-II | - | - | 4 | 2 | 75 | **ISE** | 25 | 10 | 30 |
| | | | | | | | | | **ESE-POE** | 50 | 20 | |
| 8 | 201DSMOOC318 | MOOC | MOOC | - | - | - | 1 | 25 | **ISE** | 25 | 10 | 10 |
| 9 | 201DSMC319 | MC | Human Values and Ethics (Mandatory Course-III) | 2 | - | - | - | 50 | **ESE** | 50 | 20 | 20 |
| Total | | | | 17 | 1 | 8 | 21 | 725 | - | - | - | 290 |
| | | | | **26** | | | | | | | | |

***ISE: In Semester Evaluation*** ***MSE: Mid Semester Examination*** ***ESE: End Semester Examination***

**Note 1 : Tutorials and practical shall be conducted in batches with batch strength not exceeding 15 students.**

**Professional Elective I**

1. Introduction to AI.
2. Internet Of Things.
3. Fundamentals of Digital Image Processing.

**Open Elective-I**

1. E- Commerce & Digital Marketing.
2. Python Programming.

## Final Year B. Tech. Program in Computer Science & Engineering (DS), Semester – VII

| Sr. No | Course Code | Course Type | Name of the Course | Teaching Scheme Per Week | | | Credits | Total Marks | Evaluation Scheme | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Lecture Hours | Tutorial Hours | Practical Hours | | | Type | Max. Marks | Min. Marks for Passing | |
| 1 | 201DSL401 | PCC | Advanced ML | 3 | - | - | 3 | 100 | **ISE** | 20 | 20 | 40 |
| | | | | | | | | | **MSE** | 30 | | |
| | | | | | | | | | **ESE** | 50 | 20 | |
| 2 | 201DSL402 | PCC | Cloud Computing | 3 | - | - | 3 | 100 | **ISE** | 20 | 20 | 40 |
| | | | | | | | | | **MSE** | 30 | | |
| | | | | | | | | | **ESE** | 50 | 20 | |
| 3 | 201DSL403 | PEC | Professional Elective-II | 3 | 1 | - | 4 | 100 | **ISE** | 20 | 20 | 40 |
| | | | | | | | | | **MSE** | 30 | | |
| | | | | | | | | | **ESE** | 50 | 20 | |
| 4 | 201DSL404 | OEC | Open Elective-II | 3 | - | - | 3 | 100 | **ISE** | 30 | 20 | 40 |
| | | | | | | | | | **MSE** | 20 | | |
| | | | | | | | | | **ESE** | 50 | 20 | |
| 5 | 201DSP405 | PCC | Advanced ML Laboratory | - | - | 2 | 1 | 50 | **ISE** | 25 | 10 | 20 |
| | | | | | | | | | **ESE- POE** | 25 | 10 | |
| 6 | 201DSP406 | PCC | Cloud Computing Laboratory | - | - | 2 | 1 | 50 | **ISE** | 25 | 10 | 20 |
| | | | | | | | | | **ESE- OE** | 25 | 10 | |
| 7 | 201DSP407 | PROJ | Project - III | - | - | 4 | 2 | 150 | **ISE** | 75 | 30 | 60 |
| | | | | | | | | | **ESE-POE** | 75 | 30 | |
| 8 | 201DSP408 | PROJ | Internship | - | - | - | 2 | - | - | - | - | - |
| 9 | 201DSMOOC409 | MOOC | MOOC | - | - | - | 1 | 25 | **ISE** | 25 | 10 | 10 |
| Total | | | | 12 | 1 | 8 | 20 | 675 | - | - | - | 270 |
| | | | | **21** | | | | | | | | |

***ISE: In Semester Evaluation*** ***MSE: Mid Semester Examination*** ***ESE: End Semester Examination***

**Note 1 : Tutorials and practical shall be conducted in batches with batch strength not exceeding 15 students.**

**Note 2 : ESE will be conducted for 100 marks and converted to 50 marks.**

**Professional Elective II:**

1. Advance IOT.
2. Cyber Forensics.
3. Computer Vision.

**Open Elective-II**

1. Security & Privacy in Social Networks.
2. Web Applications Development.

## Final Year B. Tech. Program in Computer Science & Engineering(DS), Semester – VIII

| Sr. No | Course Code | Course Type | Name of the Course | Teaching Scheme Per Week | | | Credits | Total Marks | Evaluation Scheme | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Lecture Hours | Tutorial Hours | Practical Hours | | | Type | Max. Marks | Min. Marks for Passing | |
| 1 | 201DSL410 | PCC | Deep Learning | 3 | - | - | 3 | 100 | **ISE** | 20 | 20 | 40 |
| | | | | | | | | | **MSE** | 30 | | |
| | | | | | | | | | **ESE** | 50 | 20 | |
| 2 | 201DSL411 | PCC | Text Mining and Analytics | 3 | - | - | 3 | 100 | **ISE** | 20 | 20 | 40 |
| | | | | | | | | | **MSE** | 30 | | |
| | | | | | | | | | **ESE** | 50 | 20 | |
| 3 | 201DSL412 | PCC | Time Series and Forecasting | 3 | 1 | - | 4 | 100 | **ISE** | 20 | 20 | 40 |
| | | | | | | | | | **MSE** | 30 | | |
| | | | | | | | | | **ESE** | 50 | 20 | |
| 4 | 201DSL413 | PEC | Professional Elective-III | 3 | - | - | 3 | 100 | **ISE** | 20 | 20 | 40 |
| | | | | | | | | | **MSE** | 30 | | |
| | | | | | | | | | **ESE** | 50 | 20 | |
| 5 | 201DSL414 | PCC | Deep Learning Laboratory | - | - | 2 | 1 | 50 | **ISE** | 25 | 10 | 20 |
| | | | | | | | | | **ESE POE** | 25 | 10 | |
| 6 | 201DSL415 | PCC | Time Series and Forecasting Laboratory | - | - | 2 | 1 | 50 | **ISE** | 25 | 10 | 20 |
| | | | | | | | | | **ESE OE** | 25 | 10 | |
| 7 | 201DSP416 | HSMC | Community Services | - | - | 2 | 1 | 25 | **ISE** | 25 | 10 | 10 |
| 8 | 201DSP417 | PROJ | Project-IV | - | - | 4 | 2 | 150 | **ISE** | 75 | 30 | 60 |
| | | | | | | | | | **ESE-POE** | 75 | 30 | |
| Total | | | | 12 | 1 | 10 | 18 | 675 | - | - | - | 270 |
| | | | | **23** | | | | | | | | |

***ISE: In Semester Evaluation*** ***MSE: Mid Semester Examination*** ***ESE: End Semester Examination***

**Note 1 : Tutorials and practical shall be conducted in batches with batch strength not exceeding 15 students.**

**Note 2 : ESE will be conducted for 100 marks and converted to 50 marks**

**Professional Elective III:**

1. Recommendation System.
2. E-Commerce and Marketing.
3. Business Analytics.

| |
|---|
| BSC-CS: Basic Science Course – Computer Science and Engineering arecompulsory. |
| ESC-CS: Engineering Science Course - Computer Science and Engineering arecompulsory. |
| PCC-CS: Professional Core Course – Computer Science and Engineering arecompulsory. |
| HM-CS: Humanities and Management- Computer Science and Engineering arecompulsory. |
| PW-CS: Project Work–- Computer Science and Engineering arecompulsory. |
| MC-CS: Mandatory Course -Environmental Studies which is compulsory for theory 70 marks and project work 30 marks |

Proposed MOOC Courses for DS/AI-ML

MOOC Course carry 1 credit and Evaluation is through ISE (25 Marks)

Duration: 8 to 11 weeks

List of Websites which offers online certification courses:

1. Swayam- https://swayam.gov.in/
2. NPTEL- https://onlinecourses.nptel.ac.in/
3. Mooc- http://mooc.org/
4. Edx - https://www.edx.org/
5. Coursera- https://www.coursera.org/
6. Udacity - https://in.udacity.com/
7. Udemy - https://www.udemy.com/

Students should select any courses from above list in consultation with their project guide.

All the Certificates received by the students for MOOCs Courses from approved organization (listed above) is to be submitted to the Office of the Controller of Examination/Department prior to7th and 8th Semester Examination and the Credit earned through MOOCs courses will be reflected in their Results.