# Sanjay Ghodawat University Kolhapur




# School of Engineering and Technology

## Department of Artificial Intelligence and Machine Learning

## B. Tech. Artificial Intelligence and Machine Learning

# Curriculum Structure and Syllabus (R23)

## Semester: I-VIII

## Programme Structure for B Tech.: First Artificial Intelligence and Machine Learning

### Semester I: Teaching Scheme

| Course Code | Course Name | Teaching Scheme (Hrs/week) | | | Credits Assigned | | | |
|---|---|---|---|---|---|---|---|---|
| | | Th | Pr | Tu | Th | Pr | Tu | Total credits |
| U01BS101 | Applied Mathematics I | 3 | - | - | 3 | - | - | 3 |
| U01BS001<br>U01BS002 | Applied Chemistry<br>OR<br>Applied Physics | 3 | - | - | 3 | - | - | 3 |
| U01ES001<br>U01ES002 | Engineering Mechanics<br>OR<br>Engineering Graphics | 2 | - | - | 2 | - | - | 2 |
| U01ES003<br>U01ES004 | Basic Civil and Mechanical Engineering<br>OR<br>Basic Electrical and Electronics Engineering | 3 | - | - | 3 | - | - | 3 |
| U01BS003<br>U01BS004 | Applied Chemistry Lab<br>OR<br>Applied Physics Lab | - | 2 | - | - | 1 | - | 1 |
| U01ES005<br>U01ES006 | Engineering Mechanics Lab<br>OR<br>Engineering Graphics Lab | - | 4 | - | - | 2 | - | 2 |
| U01ES007<br>U01ES008 | Basic Civil and Mechanical Engineering Lab<br>OR<br>Basic Electrical and Electronics Engineering Lab | - | 2 | - | - | 1 | - | 1 |
| U03AE001<br>U14IK001 | Professional Communication<br>OR<br>Ancient Indian Logic from the view point of Computer Science and Engineering | 2* | - | - | 2 | - | - | 2 |
| U01VS001<br>U01VS002 | Workshop Practice-I:C Programming<br>OR<br>Workshop Practice-II: Basic Engineering Practices | - | 4 | - | - | 2 | - | 2 |
| U04CC0XX | Co-curricular Courses I | - | 4 | - | - | 2 | - | 2 |
| U03VE001 | Constitution of India | 2 | - | - | 2 | - | - | 2 |
| U03VE002 | Universal Human Values-I[#] | - | - | - | | | | **Audit Course** |
| | **Total** | **15** | **16** | **-** | **15** | **8** | **-** | **23** |

***Out of 2 hours, 1 hour theory shall be taught to entire class followed by 1 hrs. Practical in batches,Th: Theory, Pr: Practical, Tu: Tutorial**

**#During the Induction Program, students would get an initial exposure to human values through Universal Human Values-I.**

## Semester I: Evaluation Scheme

| Course Code | Course Name | Theory Marks | | | | | Practical Marks | | Total |
|---|---|---|---|---|---|---|---|---|---|
| | | Internal Assessment | | | | ESE | Term work | Practical Oral/POE | |
| | | T1 | T2 | FET | Total | | | | |
| U01BS101 | Applied Mathematics I | 10 | 10 | 5 | 25 | 50 | - | - | 75 |
| U01BS001<br>U01BS002 | Applied Chemistry<br>OR<br>Applied Physics | 10 | 10 | 5 | 25 | 50 | - | - | 75 |
| U01ES001<br>U01ES002 | Engineering Mechanics<br>OR<br>Engineering Graphics | - | 10 | 5 | 15 | 35 | - | - | 50 |
| U01ES003<br>U01ES004 | Basic Civil and Mechanical Engineering<br>OR<br>Basic Electrical and Electronics Engineering | 10 | 10 | 5 | 25 | 50 | - | - | 75 |
| U01BS003<br>U01BS004 | Applied Chemistry Lab<br>OR<br>Applied Physics Lab | - | - | - | - | - | 25 | - | 25 |
| U01ES005<br>U01ES006 | Engineering Mechanics Lab<br>OR<br>Engineering Graphics Lab | - | - | - | - | - | 50 | - | 50 |
| U01ES007<br>U01ES008 | Basic Civil and Mechanical Engineering Lab<br>OR<br>Basic Electrical and Electronics Engineering Lab | - | - | - | - | - | 25 | - | 25 |
| U03AE001<br>U14IK001 | Professional Communication<br>OR<br>Ancient Indian Logic from the view point of Computer Science and Engineering | - | 10 | 5 | 15 | 35 | - | - | 50 |
| U01VS001<br>U01VS002 | Workshop Practice-I:C Programming<br>OR<br>Workshop Practice-II:<br>Basic Engineering Practices | - | - | - | - | - | 50 | - | 50 |
| U04CC0XX | Co-curricular courses I | - | - | - | - | - | 50 | - | 50 |
| U03VE001 | Constitution of India | 10 | - | 5 | 15 | 35 | - | - | 50 |
| U03VE002 | Universal Human Values-I | - | - | - | - | - | - | - | **Audit Course** |

**Minimum passing is 40% for all courses and evaluation head mentioned above. FET – Faculty evaluation for Theory, T1, T2, Continuous Assessment Test, Term Work , ESE - End Semester Examination, P/F – Pass/ Fail Course, AU – Audit Course**

## Programme Structure for B Tech.: First Year Artificial Intelligence and Machine Learning

## Semester II: Teaching Scheme

| Course Code | Course Name | Teaching Scheme (Hrs/week) | | | Credits Assigned | | | |
|---|---|---|---|---|---|---|---|---|
| | | Th | Pr | Tu | Th | Pr | Tu | Total Credits |
| U01BS201 | Applied Mathematics II | 3 | - | - | 3 | - | - | 3 |
| U01BS001<br>U01BS002 | Applied Chemistry<br>OR<br>Applied Physics | 3 | - | - | 3 | - | - | 3 |
| U01ES001<br>U01ES002 | Engineering Mechanics<br>OR<br>Engineering Graphics | 2 | - | - | 2 | - | - | 2 |
| U01ES003<br>U01ES004 | Basic Civil and Mechanical Engineering<br>OR<br>Basic Electrical and Electronics Engineering | 3 | - | - | 3 | - | - | 3 |
| U01BS003<br>U01BS004 | Applied Chemistry Lab<br>OR<br>Applied Physics Lab | - | 2 | - | - | 1 | - | 1 |
| U01ES005<br>U01ES006 | Engineering Mechanics Lab<br>OR<br>Engineering Graphics Lab | - | 4 | - | - | 2 | - | 2 |
| U01ES007<br>U01ES008 | Basic Civil and Mechanical Engineering Lab<br>OR<br>Basic Electrical and Electronics Engineering Lab | - | 2 | - | - | 1 | - | 1 |
| U03AE001<br>U14IK001 | Professional Communication<br>OR<br>Ancient Indian Logic from the view point of Computer Science and Engineering | 2* | - | - | 2 | - | - | 2 |
| U01VS001<br>U01VS002 | Workshop Practice-I:C Programming<br>OR<br>Workshop Practice-II: Basic Engineering Practices | - | 4 | - | - | 2 | - | 2 |
| U04CC0XX | Co-curricular courses II | - | 4 | - | - | 2 | - | 2 |
| | **Total** | **13** | **16** | | **13** | **8** | | **21** |

***Out of 2 hours, 1 hour Theory shall be taught to entire class followed by 1 hrs. Practical in batches, Th: Theory, Pr: Practical, Tu: Tutorial**

## Semester II: Evaluation Scheme

| Course Code | Course Name | Theory Marks | | | | | Practical Marks | | Total |
|---|---|---|---|---|---|---|---|---|---|
| | | Internal Assessment | | | | ESE | Term work | Practical Oral/POE | |
| | | T1 | T2 | FET | Total | | | | |
| U01BS201 | Applied Mathematics II | 10 | 10 | 5 | 25 | 50 | - | - | 75 |
| U01BS001<br>OR<br>U01BS002 | Applied Chemistry<br>OR<br>Applied Physics | 10 | 10 | 5 | 25 | 50 | - | - | 75 |
| U01ES001<br>OR<br>U01ES002 | Engineering Mechanics<br>OR<br>Engineering Graphics | - | 10 | 5 | 15 | 35 | - | - | 50 |
| U01ES003<br>OR<br>U01ES004 | Basic Civil and Mechanical Engineering<br>OR<br>Basic Electrical and Electronics Engineering | 10 | 10 | 5 | 25 | 50 | - | - | 75 |
| U01BS003<br>OR<br>U01BS004 | Applied Chemistry Lab<br>OR<br>Applied Physics Lab | - | - | - | - | - | 25 | - | 25 |
| U01ES005<br>OR<br>U01ES006 | Engineering Mechanics Lab<br>OR<br>Engineering Graphics Lab | - | - | - | - | - | 50 | - | 50 |
| U01ES007<br>OR<br>U01ES008 | Basic Civil and Mechanical Engineering Lab<br>OR<br>Basic Electrical and Electronics Engineering Lab | - | - | - | - | - | 25 | - | 25 |
| U03AE001<br>OR<br>U14IK001 | Professional Communication<br>OR<br>Ancient Indian Logic from the view point of Computer Science and Engineering | - | 10 | 5 | 15 | 35 | - | - | 50 |
| U01VS001<br>OR<br>U01VS002 | Workshop Practice-I:C Programming<br>OR<br>Workshop Practice-II:<br>Basic Engineering Practices | - | - | - | - | - | 50 | - | 50 |
| U04CC0XX | Co-curricular courses II | - | - | - | - | - | 50 | - | 50 |

- **Minimum passing is 40% for all courses and evaluation head mentioned above. FET – FET – Faculty evaluation for Theory, T1, T2, Continuous Assessment Test, Term Work, ESE - End Semester Examination, P/F – Pass/ Fail Course, AU – Audit Course**

- **Exit Option:**

Students will have the flexibility to enter a Programme in odd semesters and exit a Programme after the successful completion of even semesters as per their future career needs. Students exiting the First-Year program after securing minimum 40 creditswill be awarded UG Certificate in the relevant Discipline /Subject provided they secure 4 credits in work-based vocational courses or internship / Apprenticeship offered during summer vacation in addition to 8 credits from skill-based courses earned during the first and second semester.

## Programme structure for B. Tech. First Year Artificial Intelligence and Machine Learning

## Semester II: Teaching Scheme

| Course code | Course name | Teaching scheme (Hrs/week) | | | Credits assigned | | | Total credits |
|---|---|---|---|---|---|---|---|---|
| | | Theory | Practical | Tutorial | Theory | Practical | Tutorial | |
| U12PC301 | Fuzzy Mathematics & Statistics | 3 | - | - | 3 | - | - | 3 |
| U12PC302 | Introduction to AI | 3 | - | - | 3 | - | - | 3 |
| U12PC303 | Operating System | 3 | - | - | 3 | - | - | 3 |
| UXXMM0XX | Multidisciplinary Minor I | 2 | - | - | 2 | - | - | 2 |
| UXXOE01X | Open Elective I | 2 | - | - | 2 | - | - | 2 |
| U02EM001 | Engineering Economics | 2 | - | - | 2 | - | - | 2 |
| U12PC304 | Introduction to AI Lab | - | 2 | - | - | 1 | - | 1 |
| U12PC305 | Object Oriented Programming using Python | - | 4 | - | - | 2 | - | 2 |
| U01VE003 | Environmental Sciences | 2 | - | - | 2 | - | - | 2 |
| U12FP001 | Field Project I | | 4 | - | - | 2 | - | 2 |
| **Total** | | **17** | **10** | **-** | **17** | **5** | **-** | **22** |

## Semester III: Evaluation Scheme

| Course code | Course name | *Theory Marks* | | | | | *Practical Marks* | | Total |
|---|---|---|---|---|---|---|---|---|---|
| | | Internal Assessment | | | | ESE | Term work | Practical Oral/POE | |
| | | T1 | T2 | FET | Total | | | | |
| U12PC301 | Fuzzy Mathematics & Statistics | 10 | 10 | 5 | 25 | 50 | - | - | 75 |
| U12PC302 | Introduction to AI | 10 | 10 | 5 | 25 | 50 | - | - | 75 |
| U12PC303 | Operating System | 10 | 10 | 5 | 25 | 50 | - | - | 75 |
| UXXMM0XX | Multidisciplinary Minor I | 10 | - | 5 | 15 | 35 | - | - | 50 |
| UXXOE01X | Open Elective I | 10 | - | 5 | 15 | 35 | - | - | 50 |
| U02EM001 | Engineering Economics | 10 | - | 5 | 15 | 35 | - | - | 50 |
| U12PC304 | Introduction to AI Lab | - | - | - | - | - | 25 | - | 25 |
| U12PC305 | Object Oriented Programming using Python | - | - | - | - | - | 25 | 25 | 50 |
| U01VE003 | Environmental Sciences | 10 | - | 5 | 15 | 35 | - | - | 50 |
| U12FP001 | Field Project I | - | - | - | - | - | 25 | 25 | 50 |

* Minimum passing is 40% for all courses and evaluation head mentioned above. FET – Faculty evaluation for Theory , T1, T2, Continuous Assessment Test, Term Work , ESE - End Semester Examination, P/F – Pass/ Fail Course, AU – Audit Course

**Programme structure for B. Tech. Second Year Artificial Intelligence and Machine Learning**
**Semester IV: Teaching Scheme**

| Course code | Course Name | Teaching scheme (Hrs/week) | | | Credits assigned | | | Total credits |
|---|---|---|---|---|---|---|---|---|
| | | Theory | Practical | Tutorial | Theory | Practical | Tutorial | |
| U12PC401 | Numerical Methods & Advanced Statistics | 3 | - | - | 3 | - | - | 3 |
| U12PC402 | Data structure using python | 3 | - | - | 3 | - | - | 3 |
| U12PC403 | Database Management System | 2 | - | - | 2 | - | - | 2 |
| UXXMM0XX | Multidisciplinary Minor II | 2 | - | - | 2 | - | - | 2 |
| UXXOE02X | Open Elective II | 2 | - | - | 2 | - | - | 2 |
| U02EM002 | Engineering Management | 2 | - | - | 2 | - | - | 2 |
| U12VS401 | Software Proficiency I (R programming) | - | 4 | - | - | 2 | - | 2 |
| U12PC404 | Data structure using python Lab | - | 2 | - | - | 1 | - | 1 |
| U12PC405 | Database Management System Laboratory | - | 2 | - | - | 1 | - | 1 |
| U03AE003<br><br>U03AE005 | Modern Indian Language – Hindi<br>OR<br>Modern Indian Language – Marathi | 2 | - | - | 2 | - | - | 2 |
| U03VE004 | Universal Human Values II | 2 | - | - | 2 | - | - | 2 |
| Total | | 18 | 8 | | 18 | 4 | | 22 |

## Second Year Artificial Intelligence and Machine Learning Programs Semester IV: Evaluation Scheme

| Course code | Course Name | *Theory Marks* | | | | | *Practical Marks* | | Total |
|---|---|---|---|---|---|---|---|---|---|
| | | Internal Assessment | | | | ESE | Term work | Practical Oral /POE | |
| | | T1 | T2 | FET | Total | | | | |
| U12PC401 | Numerical Methods & Advanced Statistics | 10 | 10 | 5 | 25 | 50 | - | - | 75 |
| U12PC402 | Data structure using python | 10 | 10 | 5 | 25 | 50 | - | - | 75 |
| U12PC403 | Database Management System | 10 | - | 5 | 15 | 35 | - | - | 50 |
| UXXMM0XX | Multidisciplinary Minor II | 10 | - | 5 | 15 | 35 | - | - | 50 |
| UXXOE02X | Open Elective II | 10 | - | 5 | 15 | 35 | - | - | 50 |
| U02EM002 | Engineering Management | 10 | - | 5 | 15 | 35 | - | - | 50 |
| U12VS401 | Software Proficiency I (R programming) | - | - | - | - | - | 25 | 25 | 50 |
| U12PC404 | Data structure using python Lab | - | - | - | - | - | 25 | - | 25 |
| U12PC405 | Database Management System Laboratory | - | - | - | - | - | 25 | - | 25 |
| U03AE003<br><br>U03AE005 | Modern Indian Language – Hindi<br>OR<br>Modern Indian Language – Marathi | - | - | - | - | - | 50 | - | 50 |
| U03VE004 | Universal Human Values II | 10 | - | 5 | 15 | 35 | - | - | 50 |

* Minimum passing is 40% for all courses and evaluation head mentioned above. FET – Faculty evaluation for Theory, T1, T2, Continuous Assessment Test, Term Work, ESE - End Semester Examination, P/F – Pass/ Fail Course, AU – Audit Course

**Exit Option:**

Students will have the flexibility to enter a programme in odd semesters and exit a programme after the successful completion of even semesters as per their future career needs.Students exiting the Second Year Programme after securing minimum 80credits will be awarded UG Diploma in the relevant Discipline /Subject provided they secure additional 8 credits in skill-based vocational courses (skill-based courses, internship, mini projects etc) offered during summer vacation after the second year.

**Programme structure for B. Tech. Third Year Artificial Intelligence and Machine Learning**

## Semester V: Teaching Scheme

| Course code | Course name | Teaching scheme (Hrs/week) | | | Credits assigned | | | |
|---|---|---|---|---|---|---|---|---|
| | | Theory | Practical | Tutorial | Theory | Practical | Tutorial | Total Credits |
| U12PC501 | Design and Analysis of Algorithm | 3 | - | - | 3 | - | - | 3 |
| U12PC502 | Fuzzy Logic | 3 | - | - | 3 | - | - | 3 |
| U12PC503 | Machine Learning | 3 | - | - | 3 | - | - | 3 |
| U12PE5XX | Program Elective I | 3 | - | - | 3 | - | - | 3 |
| UXXMM0XX | Multidisciplinary Minor III | 2 | - | - | 2 | - | - | 2 |
| UXXOE03X | Open Elective III | 2 | - | - | 2 | - | - | 2 |
| U12VS501 | Software Proficiency Program II (Software tools for AI & ML) | - | 4 | - | - | 2 | - | 2 |
| U12PC504 | Fuzzy Logic Lab | - | 2 | - | - | 1 | - | 1 |
| U12PC505 | Machine Learning Lab | - | 4 | - | - | 2 | - | 2 |
| | Total | 16 | 10 | | 16 | 5 | | **21** |

| **Program Elective I** | | | |
|---|---|---|---|
| **Vertical I (Data Analytics)** | | **Vertical II(Data Management)** | |
| **Code** | **Course Name** | **Code** | **Course Name** |
| U12PE511 | Digital Image Processing | U12PE521 | Advanced Database |
| **Vertical III (Cloud Computing)** | | | |
| **Code** | **Course Name** | | |
| U12PE531 | Fundamental of cloud computing | | |

## Semester V: Evaluation Scheme

| Course code | Course name | *Theory Marks* | | | | | *Practical Marks* | | Total |
|---|---|---|---|---|---|---|---|---|---|
| | | Internal Assessment | | | | ESE | | | |
| | | T1 | T2 | FET | Total | | Term work | Practical Oral/POE | |
| U12PC501 | Design and Analysis of Algorithm | 10 | 10 | 5 | 25 | 50 | - | - | 75 |
| U12PC502 | Fuzzy Logic | 10 | 10 | 5 | 25 | 50 | - | - | 75 |
| U12PC503 | Machine Learning | 10 | 10 | 5 | 25 | 50 | - | - | 75 |
| U12PE5XX | Program Elective I | 10 | 10 | 5 | 25 | 50 | - | - | 75 |
| UXXMM0XX | Multidisciplinary Minor III | - | 10 | 5 | 15 | 35 | | | 50 |
| UXXOE03X | Open Elective III | - | 10 | 5 | 15 | 35 | - | - | 50 |
| U12VS501 | Software Proficiency Program II (Software tools for AI & ML) | - | - | - | - | - | 25 | 25 | 50 |
| U12PC504 | Fuzzy Logic Lab | - | - | - | - | - | 25 | - | 25 |
| U12PC505 | Machine Learning Lab | - | - | - | - | | 25 | 25 | 50 |

* Minimum passing is 40% for all courses and evaluation head mentioned above. FET – Faculty evaluation for Theory, T1, T2, Continuous Assessment Test, FEP, Faculty Evaluation for Practical, ESE - End Semester Examination, P/F – Pass/ Fail Course, AU – Audit Course

## Programme structure for B. Tech. Third Year Artificial Intelligence and Machine Learning

## Semester VI: Teaching Scheme

| Course code | Course name | Teaching scheme (Hrs/week) | | | Credits assigned | | | |
|---|---|---|---|---|---|---|---|---|
| | | Theory | Practical | Tutorial | Theory | Practical | Tutorial | Total credits |
| U12PC601 | Natural Language Processing | 3 | - | - | 3 | - | - | 3 |
| U12PC602 | Deep Learning | 3 | - | - | 3 | - | - | 3 |
| U12PC603 | Data Visualization | 3 | - | - | 3 | - | - | 3 |
| U12PE6XX | Program Elective II | 3 | - | - | 3 | - | - | 3 |
| U12PE6XX | Program Elective III | 3 | - | - | 3 | - | - | 3 |
| UXXMM0XX | Multidisciplinary Minor IV | 2 | - | - | 2 | - | - | 2 |
| U12PC604 | Software Proficiency III(Data analytics using Tableau & PowerBI ) | - | 4 | - | - | 2 | - | 2 |
| U12PC605 | Data Visualization Lab | - | 4 | - | - | 2 | - | 2 |
| U12PC606 | Natural Language Processing Lab | - | 2 | - | - | 1 | - | 1 |
| | Total | **17** | 10 | - | 17 | 5 | - | 22 |

| **Program Elective II** | | | |
|---|---|---|---|
| **Vertical I (Data Analytics)** | | **Vertical II (Data Management)** | |
| **Code** | **Course Name** | **Code** | **Course Name** |
| U12PE611 | Pattern Recognition | U12PE621 | Data Mining and Warehousing |

| **Vertical III (Cloud Computing)** | |
|---|---|
| **Code** | |
| U12PE631 | AWS |

**Programme structure for B. Tech: Final Year Artificial Intelligence and Machine Learning (R23)**
**Semester VII: Teaching Scheme**

| Course code | Course name | Teaching scheme (Hrs/week) | | | Credits assigned | | | |
|---|---|---|---|---|---|---|---|---|
| | | Th. | Pr | Tu. | Th. | Pr | Tu. | Total credits |
| U12PC701 | Optimization Techniques | 3 | - | - | 3 | - | - | 3 |
| U12PC702 | Computer Vision | 3 | - | - | 3 | - | - | 3 |
| U12PE7XX | Program Elective IV | 3 | - | - | 3 | - | - | 3 |
| U01RM701 | Research Methodology | 3 | - | - | 3 | - | - | 3 |
| UXXMM0XX | Multidisciplinary Minor V | 2 | - | - | 2 | - | - | 2 |
| U12PC703 | Optimization Techniques Lab | - | 4 | - | - | 2 | - | 2 |
| U12PC704 | Computer Vision Lab | - | 4 | - | - | 2 | - | 2 |
| U12PE7XX | Program Elective IV Lab | - | 4 | - | - | 2 | - | 2 |
| U12PR701 **OR** U12EP701 **OR** U12RE701 | Project Phase I (Industry Internship with Capstone Project Track) **OR** Entrepreneurship Project Phase I (Entrepreneurship Venture Track) **OR** Research Project Phase I (Higher Opportunity Track) | - | 4 | - | - | 2 | - | 2 |
| **Total** | | 14 | 16 | | 14 | 8 | | 22 |

Th.: Theory, Pr: Practical, Tu.: Tutorial

| **Program Elective IV** | | | |
|---|---|---|---|
| **Vertical I (Data Analytics)** | | **Vertical II (Data Management)** | |
| **Code** | **Course Name** | **Code** | **Course Name** |
| U12PE711 | ARVR | U12PE721 | Business Intelligence |
| **Vertical III (Cloud Computing)** | | | |
| Code | Course Name | | |
| U12PE731 | Devops & MLOPS | | |

| **Program Elective IV Lab** | | | |
|---|---|---|---|
| **Vertical I (Data Analytics)** | | **Vertical II (Data Management)** | |
| **Code** | **Course Name** | **Code** | **Course Name** |
| U12PE712 | ARVR Lab | U12PE722 | Intelligence System Lab |
| **Vertical III (Cloud Computing)** | | | |
| **Code** | **Course Name** | | |
| U12PE732 | Devops & MLOPS Lab | | |

## Semester VII : Evaluation Scheme

| Course code | Course name | *Theory Marks* | | | | | Practical Marks | | Total |
|---|---|---|---|---|---|---|---|---|---|
| | | Evaluation(Theory) | | | | ESE | Term work | Practical Oral/POE | |
| | | T1 | T2 | FET | Total | | | | |
| U12PC701 | Optimization Techniques | 10 | 10 | 5 | 25 | 50 | - | - | 75 |
| U12PC702 | Computer Vision | 10 | 10 | 5 | 25 | 50 | - | - | 75 |
| U12PE7XX | Program Elective IV | 10 | 10 | 5 | 25 | 50 | - | - | 75 |
| U01RM701 | Research Methodology | 10 | 10 | 5 | 25 | 50 | - | - | 75 |
| U12MM0XX | Multidisciplinary Minor V | - | 10 | 5 | 15 | 35 | - | - | 50 |
| U12PC703 | Optimization Techniques Lab | - | - | - | - | - | 25 | 25 | 50 |
| U12PC704 | Computer Vision Lab | - | - | - | - | | 25 | 25 | 50 |
| U12PE7XX | Program Elective IV Lab | - | - | - | - | - | 25 | 25 | 50 |
| U12PR701<br>**OR**<br>U12EP701<br>**OR**<br>U12RE701 | Project Phase I<br>(Industry Internship with Capstone Project)<br>**OR**<br>Entrepreneurship Project Phase I<br>(Entrepreneurship Venture Track)<br>**OR**<br>Research Project Phase I<br>(Higher Opportunity Track) | - | - | - | - | - | 50 | - | 50 |
| | | | | | | | | Total | 550 |

*Minimumpassingis40%forallcoursesandevaluationheadmentionedabove.FET–FacultyevaluationforTheory, T1, T2, Continuous Assessment Test, FEP, Faculty Evaluation for Practical, ESE -End Semester Examination, P/F – Pass/ Fail Course, AU – Audit Course

**Note:** The Evaluation of Project Phase I is divided into two parts (Internal Assessment)

a) Preparation and presentation of the proposal of the Project (Motivation/ Relevance, Problem Statement, Literature Survey, Objectives, Methodology and design of the project) for 25marks.

b) Student shall present a seminar on the topic relevant to the Project work for 25 marks.

**Programme structure for B. Tech : Final Year Artificial Intelligence and Machine Learning (R23)**
**Semester VIII: Teaching Scheme**

## Track I: Industry Internship with Capstone Project Track

| Course code | Course name | Teaching scheme | | | Credits assigned | | | |
|---|---|---|---|---|---|---|---|---|
| | | Th | Pr | Tu | Th | Pr | Tu | Total credits |
| U12PE8XX | Program Elective V | 3 | - | - | 3 | - | - | 3 |
| UXXMM0XX | Multidisciplinary Minor VI | 2 | - | - | 2 | - | - | 2 |
| U12PR801 | Project Phase II | - | 8 | - | - | 4 | - | 4 |
| U12OT801 | Internship/On job Training | - | 24 | - | - | 12 | - | 12 |
| **Total** | | **5** | **32** | **-** | **5** | **16** | **-** | **21** |

Th: Theory ,Pr: practical ,Tu: Tutorial

| **Program Elective V** | | | |
|---|---|---|---|
| **Vertical I (Data Analytics)** | | **Vertical II (Data Management))** | |
| **Code** | **Course Name** | **Code** | **Course Name** |
| U12PE811 | Recommendation System | U12PE821 | Business Analytics |
| **Vertical III (Cloud Computing)** | | | |
| **Code** | **Course Name** | | |
| U12PE831 | Advanced Cloud Computing | | |

Note: The Program Elective V and Multidisciplinary Minor VI shall be conducted in online mode, by faculty of SGU or other institute/ University. Students can also opt a course from MOOCs platforms such as SWAYAM, NPTEL, Coursera etc. In case there is no assessment and examination conducted by the MOOCs platforms then the assessment and examination will be conducted by SGU.

## Semester VIII: Evaluation Scheme

### Track I: Industry Internship with Capstone Project Track

| Course code | Course name | Theory Marks | | | | | Practical Marks | | Total |
|---|---|---|---|---|---|---|---|---|---|
| | | Evaluation(Theory) | | | | ESE | Evaluation(Lab) | | |
| | | T1 | T2 | FET | Total | | Term work | Practical Oral/POE | |
| U12PE8XX | Program Elective V | 10 | 10 | 5 | 25 | 50 | - | - | 75 |
| UXXMM0XX | Multidisciplinary Minor VI | - | 10 | 5 | 15 | 35 | - | - | 50 |
| U12PR801 | Project Phase II | - | - | - | - | - | 50 | 50 | 100 |
| U12OT801 | Internship/On job Training | - | - | - | - | - | 200 | 100 | 300 |
| | | | | | | | | Total | 525 |

*Minimum passing is 40% for all courses and evaluation head mentioned above.FET–Faculty evaluation for Theory, T1, T2, Continuous Assessment Test, FEP, Faculty Evaluation for Practical, ESE -End Semester Examination, P/F – Pass/ Fail Course, AU – Audit Course

- Additional Credits for Bachelor's Degree-with Double Minor: 12 Credits.
  These are additional credits to be offered from the second year to the final year and will be offered as an option to students.
- Additional Credits for Bachelor's Degree-with Honors: 16-20 Credits.
  These are additional credits from same domain to be offered from the second year to the final year and will be offered as optionto students.
- Additional Credits for Bachelor's Degree-Honors with Research: Minimum16-20 Credits.
  These are additional credits to be offered in the final year and will be offered as an option to students.

**Programme structure for B. Tech : Final Year Artificial Intelligence and Machine Learning**
**(R23) Semester VIII: Teaching Scheme**

## Track II: Entrepreneurship Venture Track

| Course code | Course name | Teaching scheme (Hrs/week) | | | Credits assigned | | | |
|---|---|---|---|---|---|---|---|---|
| | | Th | Pr | Tu | Th | Pr | Tu | Total |
| U12PE8XX | Program Elective V | 3 | - | - | 3 | - | - | 3 |
| UXXMM0XX | Multidisciplinary Minor VI | 2 | - | - | 2 | - | - | 2 |
| U12EP801 | Online Course in Advanced Technology (domain area) | - | - | - | 4 | - | - | 4 |
| U12EP802 | Entrepreneurship project Phase II | - | 24 | - | - | 12 | - | 12 |
| | **Total** | **5** | **24** | **-** | **9** | **12** | **-** | **21** |

Th: Theory, Pr: Practical, Tu: Tutorial

| **Program Elective V** | | | |
|---|---|---|---|
| **Vertical I (Data Analytics)** | | **Vertical II (Data Management))** | |
| **Code** | **Course Name** | **Code** | **Course Name** |
| U12PE811 | Recommendation System | U12PE821 | Business Analytics |
| **Vertical III (Cloud Computing)** | | | |
| **Code** | **Course Name** | | |
| U12PE831 | Advanced Cloud Computing | | |

Note: The Program Elective V and Multidisciplinary Minor VI shall be conducted in online mode, by faculty of SGU or other institute/ University. Students can also opt a course from MOOCs platforms such as SWAYAM, NPTEL, Coursera etc. In case there is no assessment and examination conducted by the MOOCs platforms then the assessment and examination will be conducted by SGU.

## Semester VIII: Evaluation Scheme

### Track II: Entrepreneurship Venture Track

| Course code | Course name | Theory Marks | | | | | Practical Marks | | Total |
|---|---|---|---|---|---|---|---|---|---|
| | | Evaluation(Theory) | | | | ESE | Evaluation(Lab) | | |
| | | T1 | T2 | FET | Total | | Term work | Practical Oral/POE | |
| U12PE8XX | Program Elective IV | 10 | 10 | 5 | 25 | 50 | - | - | 75 |
| UXXMM0XX | Multidisciplinary Minor VI | - | 10 | 5 | 15 | 35 | - | - | 50 |
| U12EP801 | Online Course in Advanced Technology (domain area) | - | - | - | 25 | 75 | - | - | 100 |
| U12EP802 | Entrepreneurship project Phase II | - | - | - | - | - | 200 | 100 | 300 |
| | | | | | | | | Total | 525 |

*Minimum passing is 40% for all courses and evaluation head mentioned above.FET–Faculty evaluation for Theory, T1, T2, Continuous Assessment Test, FEP, Faculty Evaluation for Practical, ESE -End Semester Examination, P/F – Pass/ Fail Course, AU – Audit Course

- Additional Credits for Bachelor's Degree-with Double Minor: 12Credits.
  These are additional credits to be offered from the second year to the final year and will be offered as an option to students.
- Additional Credits for Bachelor's Degree-with Honors: 16-20 Credits.
  These are additional credits from same domain to be offered from the second year to the final year and will be offered as an option to students.
- Additional Credits for Bachelor's Degree-Honors with Research: Minimum16-20 Credits.
  These are additional credits to be offered in the final year and will be offered as an option to students.

**Programme structure for B. Tech: Final Year Artificial Intelligence and Machine Learning (R23)**
**Semester VIII: Teaching Scheme**

## Track III: Higher Opportunity Track

| Course code | Course name | Teaching scheme (Hrs/week) | | | Credits assigned | | | |
|---|---|---|---|---|---|---|---|---|
| | | Th | Pr | Tu | Th | Pr | Tu | Total |
| U12PE8XX | Program Elective V | 3 | - | - | 3 | - | - | 3 |
| UXXMM0XX | Multidisciplinary Minor VI | 2 | - | - | 2 | - | - | 2 |
| U12RE801 | Online Course in Advanced Technology (domain area) | - | - | - | 4 | - | - | 4 |
| U12RE802 | Research Project Phase II | - | 24 | - | - | 12 | - | 12 |
| | **Total** | **5** | **24** | **-** | **9** | **12** | **-** | **21** |

Th: Theory ,Pr: practical ,Tu: Tutorial

| **Program Elective V** | | | |
|---|---|---|---|
| **Vertical I (Data Analytics)** | | **Vertical II (Data Management))** | |
| **Code** | **Course Name** | **Code** | **Course Name** |
| U12PE811 | Recommendation System | U12PE821 | Business Analytics |
| **Vertical III (Cloud Computing)** | | | |
| **Code** | **Course Name** | | |
| U12PE831 | Advanced Cloud Computing | | |

Note: The Program Elective V and Multidisciplinary Minor VI shall be conducted in online mode, by faculty of SGU or other institute/ University. Students can also opt a course from MOOCs platforms such as SWAYAM, NPTEL, Coursera etc. In case there is no assessment and examination conducted by the MOOCs platforms then theassessment and examination will be conducted by SGU.

## Semester VIII: Evaluation Scheme

### Track III: Higher Opportunity Track

| Course code | Course name | Theory Marks | | | | | Practical Marks | | Total |
|---|---|---|---|---|---|---|---|---|---|
| | | Evaluation(Theory) | | | | ESE | Evaluation(Lab) | | |
| | | T1 | T2 | FET | Total | | Term work | Practical Oral/POE | |
| U12PE8XX | Program Elective V | 10 | 10 | 5 | 25 | 50 | - | - | 75 |
| UXXMM0XX | Multidisciplinary Minor VI | - | 10 | 5 | 15 | 35 | - | - | 50 |
| U12RE801 | Online Course in Advanced Technology (domain area) | - | - | - | 25 | 75 | - | - | 100 |
| U12RE802 | Research Project Phase II | - | - | - | - | - | 200 | 100 | 300 |
| | | | | | | | | Total | 525 |

*Minimum passing is 40% for all courses and evaluation head mentioned above.FET–Faculty evaluation for Theory, T1, T2, Continuous Assessment Test, FEP, Faculty Evaluation for Practical, ESE -End Semester Examination, P/F – Pass/ Fail Course, AU – Audit Course

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  These are additional credits to be offered from the second year to the final year and will be offered as an option to students.
- Additional Credits for Bachelor's Degree-with Honors: 16-20 Credits.
  These are additional credits from same domain to be offered from the second year to the final year and will be offered as an option to students.
- Additional Credits for Bachelor's Degree-Honors with Research: Minimum16-20 Credits.
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