ALMA MATER STUDIORUM
UNIVERSITÀ DI BOLOGNA | AREA DI CAMPUS DI FORLÌ

**2ND YEAR STUDY PLAN**

# MASTER'S DEGREE PROGRAMME
# MECHANICA ENGINEERING FOR SUSTAINABILITY
# (code 5980) – A.Y. 2024/2025

STUDY PROGRAMME COMPILING

**For 2nd year students only**

To be handed in to the **Teaching Service** in the following periods:

**September 30th – November 8th 2024**

**and/or February 10th – March 7th 2025**

REGISTRATION NUM_____

I, the Undersigned_____
(Name and Last Name)

E-mail_____@studio.unibo.it - Tel_____

While enrolling to the **2nd year** – A.Y. 2024/2025

**ASK TO SELECT THE FOLLOWING ELECTIVE COURSES (type D) FOR 12 CFU.**

**1) ELECTIVE COURSES SUGGESTED BY THE SCHOOL**

| | Cod. | Elective Courses | SSD- Disciplinary-Scientific Area | Semester | CFU |
|---|---|---|---|---|---|
| ☐ | B2392 | ELECTRIC DRIVES (6 CFU) | ING-IND/32 | 1 | 6 |
| ☐ | B2393 | ENGINEERING AND TECHNOLOGY OF CONTROL SYSTEMS (6 CFU) | ING-INF/04 | 1 | 6 |
| ☐ | B2395 | EXERGY AND PINCH POINT ANALYSIS FOR SUSTAINABLE ENERGY USE (6 CFU) | ING-IND/10 | 1 | 6 |
| ☐ | B2379 | EXPERIMENTAL FLUID MECHANICS | ICAR/01 | 1 | 6 |
| ☐ | B2390 | MANUFACTURING TECHNOLOGIES FOR COMPOSITE MATERIALS | ING-IND/16 | 1 | 6 |
| ☐ | B2397 | MECHANICAL DESIGN WITH ADVANCED MATERIALS (6 CFU) | ING-IND/14 | 1 | 6 |
| ☐ | B2382 | MECHANICS OF ROBOTS AND AUTOMATIC MACHINES | ING-IND/13 | 1 | 6 |
| ☐ | 37261 | NUMERICAL ANALYSIS | MAT/08 | 1 | 6 |
| ☐ | B2394 | POWERTRAINS FOR SUSTAINABLE MOBILITY (6 CFU) | ING-IND/08 | 1 | 6 |
| ☐ | B2396 | STRUCTURAL FEM MODELING APPLICATIONS (6 CFU) | ING-IND/14 | 1 | 6 |
| ☐ | B2386 | SUSTAINABLE DESIGN OF INDUSTRIAL PLANTS | ING-IND/17 | 1 | 6 |
| ☐ | B2399 | HEATING, REFRIGERATION AND THERMAL STORAGE | ING-IND/10 | 2 | 6 |
| ☐ | 73369 | MATERIALS CHEMISTRY | CHIM/07 | 2 | 6 |
| ☐ | B2398 | MODELING AND CONTROL OF SUSTAINABLE POWERTRAINS | ING-IND/08 | 2 | 6 |
| ☐ | B2378 | THEORY OF SYSTEMS AND CONTROLS FOR AUTOMATION | ING-INF/04 | 2 | 6 |

## 2) GUIDED CHOISE - 18 CFU

Students must select only one of the three guided choices - Students who select the **'Sustainable Automation'** guided choice in the second year must have already registered at least 6 credits in the scientific disciplinary sector **ING-INF/04** in the previous career (degree) or in the first year of this master's degree.

❒ **GC1 - Sustainable Automation (18 CFU):**

B2386 SUSTAINABLE DESIGN OF INDUSTRIAL PLANTS
B2383 SUSTAINABLE USE OF ENERGY (I.C.)
B2385 EXERGY AND PINCH POINT ANALYSIS FOR SUSTAINABLE ENERGY USE
B2384 POWERTRAINS FOR SUSTAINABLE MOBILITY

❒ **GC2 - Sustainable Energy and Industry (18 CFU):**

B2386 SUSTAINABLE DESIGN OF INDUSTRIAL PLANTS
B2383 SUSTAINABLE USE OF ENERGY (I.C.)
B2385 EXERGY AND PINCH POINT ANALYSIS FOR SUSTAINABLE ENERGY USE
B2384 POWERTRAINS FOR SUSTAINABLE MOBILITY

❒ **GC3 - Sustainable Design and Manufacturing (18 CFU):**

B2390 MANUFACTURING TECHNOLOGIES FOR COMPOSITE MATERIALS
B2387 ADVANCED DESIGN METHODS (I.C.)
B2389 MECHANICAL DESIGN WITH ADVANCED MATERIALS
B2388 STRUCTURAL FEM MODELING APPLICATIONS

## 3) LABORATORIES -12 CFU

All the students which carry out activities in a Laboratory of the University of Bologna MUST follow the **Health and Safety Training in Work-Places**. This training is made up of three parts: the first two are online, the third is delivered as a lesson (in presence or on the Teams platform). Information can be found at the page “Health and Safety mandatory training”, in the section Studying of the Second cycle degree web site

| | Cod. | Laboratories | Semester | SSD | CFU |
|---|---|---|---|---|---|
| ❒ | B5050 | LEARNING BY DOING INTERNSHIP | 1 | | 6 |
| ❒ | B2403 | CONDITION MONITORING AND PREDICTIVE MAINTENANCE LABORATORY (I.C.) | 2 | | 6 |
| | | B2405 PREDICTIVE MAINTENANCE | 2 | ING-INF/04 | |
| | | B2404 VIBRATION ANALYSIS | 2 | ING-IND/13 | |
| ❒ | B2406 | DESIGN AND VIRTUAL PROTOTYPING OF AUTOMATIC MACHINES LABORATORY (I.C.) | 2 | | 6 |
| | | B2407 DESIGN OF AUTOMATIC MACHINES | 2 | ING-IND/14 | |
| | | B2408 VIRTUAL PROTOTYPING | 2 | ING-IND/15 | |
| ❒ | B2411 | DIGITAL ENGINEERING LABORATORY (I.C.) | 2 | | 6 |
| | | B2414 EXTENDED REALITY FOR DIGITAL TWIN OF MECHATRONIC SYSTEMS | 2 | ING-IND/15 | |

| | | | | | |
|---|---|---|---|---|---|
| | | B2412 VIRTUALIZATION OF MECHATRONIC SYSTEMS | 2 | ING-IND/13 | |
| ❒ | B2409 | SUSTAINABLE INDUSTRY LABORATORY (I.C.) | 2 | | 6 |
| | | 60351 INDUSTRIAL AUTOMATION | 2 | ING-INF/04 | |
| | | B2410 SUSTAINABLE INDUSTRIAL LOGISTICS | 2 | ING-IND/17 | |
| ❒ | B2400 | SUSTAINABLE MOBILITY LABORATORY (I.C.) | 2 | | 6 |
| | | B2401 POWERTRAIN TESTING | 2 | ING-IND/08 | |
| | | B2402 THERMAL CONTROL | 2 | ING-IND/10 | |

## 4) FINAL PROJECT - 15 CFU

Students must select the activities of **one of the three groups up to 15 cfu**. All the students which carry out activities in a Laboratory of the University of Bologna MUST follow the **Health and Safety Training in Work-Places.** This training is made up of three parts: the first two are online, the third is delivered as a lesson (in presence or on the Teams platform). Information will be found at the page "Health and Safety mandatory training", in the section Studying of the Second cycle degree web site

**GROUP 1: 15 CFU**
❒ B2415 FINAL PROJECT (15 CFU)

**GROUP 2: 3+12 CFU**
❒ 90765 FINAL PROJECT (3 CFU)
- ❒B2421 INTERNSHIP ABROAD IN PREPARATION FOR THE FINAL PROJECT (12 CFU)
- ❒B2422 INTERNSHIP IN PREPARATION FOR THE FINAL PROJECT (12 CFU)
- ❒B2420 PREPARATION FOR THE FINAL PROJECT ABROAD (12 CFU)

**GROUP 3: 9 +6 CFU**
❒ B2416 FINAL PROJECT (9 CFU)
- ❒ B2418 INTERNSHIP ABROAD IN PREPARATION FOR THE FINAL PROJECT (6 CFU)
- ❒ B2643 INTERNSHIP IN PREPARATION FOR THE FINAL PROJECT (6 CFU)
- ❒ B2417 PREPARATION FOR THE FINAL PROJECT ABROAD (6 CFU)

---

# AND/OR

Student may submit **INDIVIDUAL STUDY PLAN.** The individual study plans, **approved by the Degree Board, cannot ignore compliance with the regulations and guidelines defined by the competent bodies**. If the study plan proposed by the student includes teaching activities activated in a restricted-access degree admission to the teaching activities must also be previously approved by the restricted-access degree Council on the basis of criteria previously identified by it.

| Course Unit Denomination | Cod. Subject | Credits | SSD | Degree Programme Code | TYPE |
|---|---|---|---|---|---|
| | | | | | |

| | | | | | |
|---|---|---|---|---|---|
| | | | | | |
| | | | | | |
| | | | | | |

Note / Motivation _____

_____

_____

_____

**Please find attached my teaching plan and the successfully passed exams list.**

Forlì, on date _____ Signature

_____