PRESIDENCY UNIVERSITY
Private University Estd. in Karnataka State by Act No. 41 of 2013
Itgalpura, Rajankunte, Yelahanka, Bengaluru – 560064

PRESIDENCY SCHOOL OF ENGINEERING
DEPARTMENT OF MECHANICAL ENGINEERING

Program Regulations and Curriculum
2026

BACHELOR OF TECHNOLOGY (B.Tech.) in
AEROSPACE ENGINEERING
based on Choice Based Credit System (CBCS) and Outcome Based Education (OBE)

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PART A – PROGRAM REGULATIONS

1. Vision & Mission of the University and the School / Department

1.1 Vision of the University

To be a value-driven global university, excelling beyond peers and creating professionals of integrity and character having concern and care for society

1.2 Mission of the University

- Commit to be an innovative and inclusive institution by seeking excellence in teaching, research and knowledge-transfer.
- Pursue Research and Development and its dissemination to the community, at large.
- Create, sustain and apply learning in an interdisciplinary environment with consideration for ethical, ecological and economic aspects of nation building.
- Provide knowledge-based technological support and services to the industry in its growth and development.
- To impart globally-applicable skill-sets to students through flexible course offerings and support industry's requirement and inculcate a spirit of new-venture creation.

1.3 Vision of Presidency School of Engineering

To be a value based, practice-driven School of Engineering and Technology, committed to developing globally-competent Engineers, dedicated to transforming Society.

1.4 Mission of Presidency School of Engineering

- Cultivate a practice-driven environment with a contemporary Learning-pedagogy, integrating theory and practice.
- Attract and nurture world-class faculty to excel in Teaching and Research, in the field of Core Engineering.
- Establish state-of-the-art facilities for effective Teaching and Learning-experiences.
- Promote Interdisciplinary Studies to nurture talent and impart relevant skill-sets for global impact.
- Instill Entrepreneurial and Leadership Skills to address Social, Environmental, and Community-needs.

1.5 Vision of Department of Mechanical Engineering

To evolve as a globally recognized Centre of Excellence in mechanical engineering and empowering students to address industrial and societal challenges through innovation, research, and sustainable solutions.

1.6 Mission of Department of Mechanical Engineering

- Impart comprehensive and cutting-edge Mechanical engineering education through state-of-the-art laboratory infrastructure, experienced faculty, and an inclusive, dynamic learning environment that fosters technical excellence and innovation.

- Promote research and collaboration with industry and academia to develop practical and sustainable solutions for industrial and societal needs.

- Empower students to become ethical, skilled professionals and responsible global citizens committed to lifelong learning and continuous professional growth.

2. Preamble to the Program Regulations and Curriculum

This is the subset of Academic Regulations and it is to be followed as a requirement for the award of B.Tech degree.

The Curriculum is designed to take into the factors listed in the Choice Based Credit System (CBCS) with focus on Social Project Based Learning, Industrial Training, and Internship to enable the students to become eligible and fully equipped for employment in industries, choose higher studies or entrepreneurship.

In exercise of the powers conferred by and in discharge of duties assigned under the relevant provision(s) of the Act, Statutes and Academic Regulations of the University, the Academic Council hereby makes the following Regulations.

3. Short Title and Applicability

a. These Regulations shall be called the Bachelor of Technology Degree Program Regulations and Curriculum 2026-2030.
b. These Regulations are subject to, and pursuant to the Academic Regulations.
c. These Regulations shall be applicable to the ongoing Bachelor of Technology Degree Programs of the 2026-2030 batch, and to all other Bachelor of Technology Degree Programs which may be introduced in future.
d. These Regulations shall supersede all the earlier Bachelor of Technology Degree Program Regulations and Curriculum, along with all the amendments thereto.
e. These Regulations shall come into force from the Academic Year 2026-2030.

4. Definitions

In these Regulations, unless the context otherwise requires:

a. "Academic Calendar" means the schedule of academic and miscellaneous events as approved by the Vice Chancellor;
b. "Academic Council" means the Academic Council of the University;
c. "Academic Regulations" means the Academic Regulations, of the University;
d. "Academic Term" means a Semester or Summer Term;
e. "Act" means the Presidency University Act, 2013;
f. "AICTE" means All India Council for Technical Education;
g. "Basket" means a group of courses bundled together based on the nature/type of the course;
h. "BOE" means the Board of Examinations of the University;
i. "BOG" means the Board of Governors of the University;
j. "BOM" means the Board of Management of the University;
k. "BOS" means the Board of Studies of a particular Department/Program of Study of the University;

l. "CGPA" means Cumulative Grade Point Average as defined in the Academic Regulations;

m. "Clause" means the duly numbered Clause, with Sub-Clauses included, if any, of these Regulations;

n. "COE" means the Controller of Examinations of the University;

o. "Course In Charge" means the teacher/faculty member responsible for developing and organising the delivery of the Course;

p. "Course Instructor" means the teacher/faculty member responsible for teaching and evaluation of a Course;

q. "Course" means a specific subject usually identified by its Course-code and Course-title, with specified credits and syllabus/course-description, a set of references, taught by some teacher(s)/course-instructor(s) to a specific class (group of students) during a specific Academic Term;

r. "Curriculum Structure" means the Curriculum governing a specific Degree Program offered by the University, and, includes the set of Baskets of Courses along with minimum credit requirements to be earned under each basket for a degree/degree with specialization/minor/honours in addition to the relevant details of the Courses and Course catalogues (which describes the Course content and other important information about the Course). Any specific requirements for a particular program may be brought into the Curriculum structure of the specific program and relevant approvals should be taken from the BOS and Academic Council at that time.

s. "DAC" means the Departmental Academic Committee of a concerned Department/Program of Study of the University;

t. "Dean" means the Dean / Director of the concerned School;

u. "Degree Program" includes all Degree Programs;

v. "Department" means the Department offering the degree Program(s) / Course(s) / School offering the concerned Degree Programs / other Administrative Offices;

w. "Discipline" means specialization or branch of B.Tech. Degree Program;

x. "HOD" means the Head of the concerned Department;

y. "L-T-P-C" means Lecture-Tutorial-Practical-Credit – refers to the teaching – learning periods and the credit associated;

z. "MOOC" means Massive Open Online Courses;

aa. "MOU" means the Memorandum of Understanding;

bb. "NPTEL" means National Program on Technology Enhanced Learning;

cc. "Parent Department" means the department that offers the Degree Program that a student undergoes;

dd. "Program Head" means the administrative head of a particular Degree Program/s;

ee. "Program Regulations" means the Bachelor of Technology Degree Program Regulations and Curriculum, 2026-30;

ff. "Program" means the Bachelor of Technology (B.Tech.) Degree Program;

gg. "PSOE" means the Presidency School of Engineering;

hh. "Registrar" means the Registrar of the University;

ii. "School" means a constituent institution of the University established for monitoring, supervising and guiding, teaching, training and research activities in broadly related fields of studies;

jj. "Section" means the duly numbered Section, with Clauses included in that Section, of these Regulations;

kk. "SGPA" means the Semester Grade Point Average as defined in the Academic Regulations;

ll. "Statutes" means the Statutes of Presidency University;

mm. "Sub-Clause" means the duly numbered Sub-Clause of these Program Regulations;

nn. "Summer Term" means an additional Academic Term conducted during the summer break (typically in June-July) for a duration of about eight (08) calendar weeks, with a minimum of thirty (30) University teaching days;

oo. "SWAYAM" means Study Webs of Active Learning for Young Aspiring Minds.

pp. "UGC" means University Grant Commission;

qq. "University" means Presidency University, Bengaluru; and

rr. "Vice Chancellor" means the Vice Chancellor of the University.

5. Program Description

The Bachelor of Technology Degree Program Regulations and Curriculum 2026-30 are subject to, and, pursuant to the Academic Regulations. These Program Regulations shall be applicable to the following ongoing Bachelor of Technology (B.Tech.) Degree Programs of 2026-30 offered by the Presidency School of Engineering (PSOE):

1. Bachelor of Technology in Civil Engineering, abbreviated as B.Tech. (Civil Engineering)
2. Bachelor of Technology in Electronics and Communication Engineering, abbreviated as B.Tech. (Electronics and Communication Engineering)
3. Bachelor of Technology in VLSI, abbreviated as B.Tech. (VLSI)
4. Bachelor of Technology in Electrical and Electronics Engineering, abbreviated as B.Tech. (Electrical and Electronics Engineering)
5. Bachelor of Technology in Mechanical Engineering, abbreviated as B.Tech. (Mechanical Engineering);
6. Bachelor of Technology in Aerospace Engineering, abbreviated as B.Tech. (Aerospace Engineering);
7. Bachelor of Technology in Petroleum Engineering, abbreviated as B.Tech. (Petroleum Engineering)

5.1 These Program Regulations shall be applicable to other similar programs, which may be introduced in future.

5.2 These Regulations may evolve and get amended or modified or changed through appropriate approvals from the Academic Council, from time to time, and shall be binding on all concerned.

5.3 The effect of periodic amendments or changes in the Program Regulations, on the students admitted in earlier years, shall be dealt with appropriately and carefully, so as to ensure that those students are not subjected to any unfair situation whatsoever, although they are required to conform to these revised Program Regulations, without any undue favour or considerations

6. Minimum and Maximum Duration

6.1 Bachelor of Technology Degree Program is a Four-Year, Full-Time Semester based program. The minimum duration of the B.Tech. Program is four (04) years and each year comprises of two academic Semesters (Odd and Even Semesters) and hence the duration of the B.Tech. program is eight (08) Semesters.

6.2 A student who for whatever reason is not able to complete the Program within the normal period or the minimum duration (number of years) prescribed for the Program, may be allowed a period of two years beyond the normal period to complete the mandatory minimum credits requirement as prescribed by the concerned Program Regulations and Curriculum. In general, the permissible maximum duration (number of years) for completion of Program is 'N' + 2 years, where 'N' stands for the normal or minimum duration (number of years) for completion of the concerned Program as prescribed by the concerned Program Regulations and Curriculum.

6.3 The time taken by the student to improve Grades/CGPA, and in case of temporary withdrawal/re-joining (Refer to Clause 16.1 of Academic Regulations), shall be counted in the permissible maximum duration for completion of a Program.

6.4 In exceptional circumstances, such as temporary withdrawal for medical exigencies where there is a prolonged hospitalization and/or treatment, as certified through hospital/medical records, women students requiring extended maternity break (certified by registered medical practitioner), and, outstanding sportspersons representing the University/State/India requiring extended time to participate in National/International sports events, a further extension of one (01) year may be granted on the approval of the Academic Council.

6.5 The enrolment of the student who fails to complete the mandatory requirements for the award of the concerned Degree (refer Section 19 of Academic Regulations) in the prescribed maximum duration (Sub-Clauses 18.1 and 18.2 of Academic Regulations), shall stand terminated and no Degree shall be awarded.

7 Program Educational Objectives (PEO)

After four years of successful completion of the program, the graduates shall be to:

PEO1. Demonstrate technical proficiency and problem-solving abilities in aerospace engineering to excel in their professional careers.

PEO2. Engage in innovative research, development, and lifelong learning to contribute to technological development and address the needs of industry and society

PEO3. Exhibit leadership, ethical responsibility, and effective communication to work collaboratively in multidisciplinary and global environments.

8 Program Outcomes (PO) and Program Specific Outcomes (PSO)

8.1 Program Outcomes (PO)

On successful completion of the Program, the students shall be able to:

PO1: Engineering Knowledge: Apply knowledge of mathematics, natural science, computing, engineering fundamentals and an engineering specialization to develop to the solution of complex engineering problems.

PO2: Problem Analysis: Identify, formulate, review research literature and analyze complex engineering problems reaching substantiated conclusions with consideration for sustainable development.

PO3: Design/Development of Solutions: Design creative solutions for complex engineering problems and design/develop systems/components/processes to meet identified needs with consideration for the public health and safety, whole-life cost, net zero carbon, culture, society and environment as required.

PO4: Conduct Investigations of Complex Problems: Conduct investigations of complex engineering problems using research-based knowledge including design of experiments, modelling, analysis & interpretation of data to provide valid conclusions.

PO5: Engineering Tool Usage: Create, select and apply appropriate techniques, resources and modern engineering & IT tools, including prediction and modelling recognizing their limitations to solve complex engineering problems.

PO6: The Engineer and The World: Analyze and evaluate societal and environmental aspects while solving complex engineering problems for its impact on sustainability with reference to economy, health, safety, legal framework, culture and environment.

PO7: Ethics: Apply ethical principles and commit to professional ethics, human values, diversity and inclusion; adhere to national & international laws.

PO8: Individual and Collaborative Team work: Function effectively as an individual, and as a member or leader in diverse/multi-disciplinary teams.

PO9: Communication: Communicate effectively and inclusively within the engineering community and society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations considering cultural, language, and learning differences

PO10: Project Management and Finance: Apply knowledge and understanding of engineering management principles and economic decision-making and apply these to one's own work, as a member and leader in a team, and to manage projects and in multidisciplinary environments.

PO11: Life-Long Learning: Recognize the need for, and have the preparation and ability for i) independent and life-long learning ii) adaptability to new and emerging technologies and iii) critical thinking in the broadest context of technological change.

8.2 Program Specific Outcomes (PSOs):

On successful completion of the Program, the students shall be able to:

PSO1: Apply core principles of aerodynamics, propulsion, aerospace structures,

flight mechanics, and materials science to analyze, design, and solve complex aerospace engineering problems using modern computational tools, simulation software, and emerging aerospace technologies.

PS02: Demonstrate practical competence in designing, analyzing, manufacturing, and testing aerospace components and systems such as aircraft structures, propulsion systems and space subsystems through laboratory experiments, simulation practices, workshops, industry-driven projects, and internships.

PSO3: Exhibit professional ethics, effective communication, teamwork, and leadership skills to function effectively in multidisciplinary and societal environments.

9 Admission Criteria (as per the concerned Statutory Body)

The University admissions shall be open to all persons irrespective of caste, class, creed, gender or nation. All admissions shall be made on the basis of merit in the qualifying examinations; provided that forty percent of the admissions in all Programs of the University shall be reserved for the students of Karnataka State and admissions shall be made through a Common Entrance Examination conducted by the State Government or its agency and seats shall be allotted as per the merit and reservation policy of the State Government from time to time**.** The admission criteria to the B.Tech. Program is listed in the following Sub-Clauses:

9.1 An applicant who has successfully completed Pre-University course or Senior Secondary School course (+2) or equivalent such as (11+1), 'A' level in Senior School Leaving Certificate Course from a recognized university of India or outside or from Senior Secondary Board or equivalent, constituted or recognized by the Union or by the State Government of that Country for the purpose of issue of qualifying certificate on successful completion of the course, may apply for and be admitted into the Program.

9.2 Provided further, the applicant must have taken Physics and Mathematics as compulsory subjects in the Pre-University / Higher Secondary / (10+2) / (11+1) examination, along with either Chemistry / Biology / Electronics / Computer Science / Biotechnology subject, and, the applicant must have obtained a minimum of 45% of the total marks (40% in case of candidates belonging to the Reserved Category as classified by the Government of Karnataka) in these subjects taken together.

9.3 The applicant must have appeared for Joint Entrance Examinations (JEE) Main / JEE (Advanced) / Karnataka CET / COMED-K, or any other State-level Engineering Entrance Examinations.

9.4 Reservation for the SC / ST and other backward classes shall be made in accordance with the directives issued by the Government of Karnataka from time to time.

9.5 Admissions are offered to Foreign Nationals and Indians living abroad in accordance with the rules applicable for such admission, issued from time to time, by the Government of India.

9.6 Candidates must fulfil the medical standards required for admission as

prescribed by the University.

9.7 If, at any time after admission, it is found that a candidate had not in fact fulfilled all the requirements stipulated in the offer of admission, in any form whatsoever, including possible misinformation and any other falsification, the Registrar shall report the matter to the Board of Management (BOM), recommending revoking the admission of the candidate.

9.8 The decision of the BOM regarding the admissions is final and binding.

10 Lateral Entry / Transfer Students requirements

10.1 Lateral Entry

The University admits students directly to the second year (3rd Semester) of the B.Tech. Degree program as per the provisions and/or regulations of the Government of Karnataka pertaining to the "Lateral Entry" scheme announced by the Government from time to time. Further, the general conditions and rules governing the provision of Lateral Entry to the B.Tech. Program of the University are listed in the following Sub-Clauses:

10.1.1 Admission to 2nd year (3rd Semester) of the B.Tech. Degree program shall be open to the candidates who are holders of a 3-year Diploma in Engineering (or equivalent qualification as recognized by the University), who have secured not less than forty-five percentage (45%) marks in the final year examination (5th and 6th Semesters of the Diploma Program) in the appropriate branch of Engineering. Provided that, in case of SC / ST and OBC candidates from Karnataka the minimum marks for eligibility shall be forty percent (40%).

10.1.2 Provided further that, candidates seeking Lateral Entry may be required to complete specified bridge Courses as prescribed by the University. Such bridge Courses, if any, shall not be included in the CGPA computations.

10.1.3 All the existing Regulations and Policies of the University shall be binding on all the students admitted to the Program through the provision of Lateral Entry.

10.1.4 The Course requirements prescribed for the 1st Year of the B.Tech. Program shall be waived for the student(s) admitted through Lateral Entry and the duration of the B.Tech. Program for such students is three (03) years, commencing from the 3rd Semester (commencement of the 2nd Year) of the B.Tech. Program and culminating with the 8th Semester (end of the 4th Year) of the B.Tech. Program.

10.1.5 Provided that, if a Lateral Entry student misses any mandatory program specific courses that are typically offered in the 1st year (1st or 2nd semesters), then those courses must be cleared by the students as soon as possible, preferably during the Summer Term.

10.1.6 The existing Program Regulations of the concerned Program to which the student is admitted through the provision of Lateral Entry shall be binding

on the student with effect from the 3rd Semester of the Program. i.e., the Program Structure and Curriculum from the 3rd to 8th Semesters of the Program concerned shall be binding on the student admitted through Lateral Entry. Further, any revisions / amendments made to the Program Regulations thereafter, shall be binding on all the students of the concerned Program.

10.1.7 All the Courses (and the corresponding number of Credits) prescribed for the 1st Year of the concerned B.Tech. Program shall be waived for the student(s) admitted to the concerned B.Tech Program through Lateral Entry. Further, the *Minimum Credit Requirements* for the award of the B.Tech. Degree in the concerned Program shall be prescribed / calculated as follows:

The ***Minimum Credit Requirements*** for the award of the Bachelor of Technology (B.Tech.) Degree prescribed by the concerned Bachelor of Technology Degree Program Regulations and Curriculum, 2025-2029, minus the number of Credits prescribed / accepted by the Equivalence Committee for the 1st Year (1st and 2nd Semesters) of the B.Tech. Program. For instance, if the *Minimum Credit Requirements* for the award of the Bachelor of Technology (B.Tech.) Degree as prescribed by the Regulations for B.Tech. (Aerospace Engineering) is "N" Credits, and, if the total credits prescribed in the 1st Year (total credits of the 1st and 2nd Semesters) of the Program concerned is "M" Credits, then the *Minimum Credit Requirements* for the award of the B.Tech. in Aerospace Engineering for a student who joins the Program through the provision of the Lateral Entry, shall be "N – M" Credits.

10.1.8 Further, no other waiver except the Courses prescribed for the 1st year of the B.Tech. Program of the University shall be permissible for students joining the B.Tech. Program through the provision of Lateral Entry.

10.2 Transfer of student(s) from another recognized University to the 2nd year (3rd Semester) of the B.Tech. Program of the University

A student who has completed the 1st Year (i.e., passed in all the Courses / Subjects prescribed for the 1st Year) of the B.Tech. / B.E. / B.S., Four-Year Degree Program from another recognized University, may be permitted to transfer to the 2nd Year (3rd Semester) of the B.Tech. Program of the University as per the rules and guidelines prescribed in the following Sub-Clauses:

10.2.1 The concerned student fulfils the criteria specified in Sub-Clauses 10.1.1, 10.1.2 and 10.1.3.

10.2.2 The student shall submit the Application for Transfer along with a non-refundable Application Fee (as prescribed by the University from time to time) to the University no later than July 10 of the concerned year for admission to the 2nd Year (3rd Semester) B.Tech. Program commencing on August 1 on the year concerned.

10.2.3 The student shall submit copies of the respective Marks Cards / Grade

Sheets / Certificates along with the Application for Transfer.

10.2.4 The transfer may be provided on the condition that the Courses and Credits completed by the concerned student in the 1st Year of the B.Tech. / B.E. / B.S. Four Degree Program from the concerned University, are declared equivalent and acceptable by the Equivalence Committee constituted by the Vice Chancellor for this purpose. Further, the Equivalence Committee may also prescribe the Courses and Credits the concerned students shall have to mandatorily complete, if admitted to the 2nd Year of the B.Tech. Program of the University.

10.2.5 The Branch / Discipline allotted to the student concerned shall be the decision of the University and binding on the student.

11. Change of Branch / Discipline / Specialization

A student admitted to a particular Branch of the B.Tech. Program will normally continue studying in that Branch till the completion of the program. However, the University reserves the right to provide the option for a change of Branch, or not to provide the option for a change of Branch, at the end of 1st Year of the B.Tech. Program to eligible students in accordance with the following rules and guidelines: framed by the University from time to time.

11.1 Normally, only those students, who have passed all the Courses prescribed for the 1st Year of the B.Tech. Program and obtained a CGPA of not less than 6.50 at the end of the 2nd Semester, shall be eligible for consideration for a change of Branch.

11.2 Change of Branch, if provided, shall be made effective from the commencement of the 3rd Semester of the B.Tech. Program. There shall be no provision for change of Branch thereafter under any circumstances whatsoever.

11.3 The student provided with the change of Branch shall fully adhere to and comply with the Program Regulations of the concerned Branch of the B.Tech. Program, the Fee Policy pertaining to that Branch of the B.Tech. Program, and, all other rules pertaining to the changed Branch existing at the time.

11.4 Change of Branch once made shall be final and binding on the student. No student shall be permitted, under any circumstances, to refuse the change of Branch offered.

11.5 The eligible student may be allowed a change in Branch, strictly in order of *inter se* merit, subject to the conditions given below:

11.5.1 The actual number of students in the 3rd Semester in any particular Branch to which the transfer is to be made, should not exceed the intake fixed by the University for the concerned Branch;

11.5.2 The actual number of students in any Branch from which transfer is being sought does not fall below 75% of the total intake fixed by the University for the concerned Branch.

The process of change of Branch shall be completed within the first five days of Registration for the 3rd Semester of the B.Tech. Program.

12 Specific Regulations regarding Assessment and Evaluation (including the Assessment Details of NTCC Courses, Weightages of Continuous Assessment and End Term Examination for various Course Categories)

12.1 The academic performance evaluation of a student in a Course shall be according to the University Letter Grading System based on the class performance distribution in the Course.

12.2 Academic performance evaluation of every registered student in every Course registered by the student is carried out through various components of Assessments spread across the Semester. The nature of components of Continuous Assessments and the weightage given to each component of Continuous Assessments (refer Clause 12.5 of academic regulations) shall be clearly defined in the Course Plan for every Course, and approved by the DAC.

12.3 Format of the End-Term examination shall be specified in the Course Plan.

12.4 Grading is the process of rewarding the students for their overall performance in each Course. The University follows the system of Relative Grading with statistical approach to classify the students based on the relative performance of the students registered in the concerned Course except in the following cases:

- Non-Teaching Credit Courses (NTCC)
- Courses with a class strength less than 30

Absolute grading method may be adopted, where necessary with prior approval of concerned DAC.

Grading shall be done at the end of the Academic Term by considering the aggregate performance of the student in all components of Assessments prescribed for the Course. Letter Grades (Clause 8.10 of academic regulations) shall be awarded to a student based on her/his overall performance relative to the class performance distribution in the concerned Course. These Letter Grades not only indicate a qualitative assessment of the student's performance but also carry a quantitative (numeric) equivalent called the Grade Point.

12.5 Assessment Components and Weightage

Table 1: Assessment Components and Weightage for different category of Courses		
Nature of Course and Structure	**Evaluation Component**	**Weightage**
Lecture-based Course L component in the L-T-P Structure is predominant (more than 1) (Examples: 3-0-0; 3-0-2; 2-1-0; 2-0-2, 2-0-4 etc.)	Continuous Assessments	50%
	End Term Examination	50%
Lab/Practice-based Course P component in the L-T-P Structure is predominant (Examples: 0-0-4; 1-0-4; 1-0-2; etc.)	Continuous Assessments	75%
	End Term Examination	25%
Skill based Courses like Industry Internship, Capstone project, Research Dissertation, Integrative Studio, Interdisciplinary Project, Summer / Short Internship, Social Engagement / Field Projects, Portfolio, and such similar Non-Teaching Credit Courses, where the pedagogy does not lend itself to a typical L-T-P structure	Guidelines for the assessment components for the various types of Courses, with recommended weightages, shall be specified in the concerned Program Regulations and Curriculum / Course Plans, as applicable.	

The exact weightages of Evaluation Components shall be clearly specified in the concerned PRC and respective Course Plan.

Normally, for Practice/Skill based Courses, without a defined credit structure (L–T–P) [NTCC], but with assigned Credits (as defined in Clause 5.2 of the Academic Regulations), the method of evaluation shall be based only on Continuous Assessments. The various components of Continuous Assessments, the distribution of weightage among such components, and the method of evaluation/assessment, shall be as decided and indicated in the Course Plan/PRC. The same shall be approved by the respective DAC.

12.6 Minimum Performance Criteria:

12.6.1 Theory only Course and Lab/Practice Embedded Theory Course

A student shall satisfy the following minimum performance criteria to be eligible to earn the credits towards the concerned Course:

a. A student must obtain a minimum of 30% of the total marks/weightage assigned to the End Term Examinations in the concerned Course.

b. The student must obtain a minimum of 40% of the AGGREGATE of the marks/weightage of the components of Continuous

Assessments, Mid Term Examinations and End Term Examinations in the concerned Course.

12.6.2 Lab/Practice only Course and Project Based Courses

The student must obtain a minimum of 40% of the AGGREGATE of the marks/weightage of all assessment components in the concerned Course.

12.6.3 A student who fails to meet the minimum performance criteria listed above in a Course shall be declared as "Fail" and given "F" Grade in the concerned Course. For theory Courses, the student shall have to re-appear in the "Make-Up Examinations" as scheduled by the University in any subsequent semester, or, re-appear in the End Term Examinations of the same Course when it is scheduled at the end of the following Semester or Summer Term, if offered. The marks obtained in the Continuous Assessments (other than the End Term Examination) shall be carried forward and be included in computing the final grade, if the student secures the minimum requirements (as per sub-Clause 8.9.1 and 8.9.2 of academic regulations) in the "Make-Up Examinations" of the concerned Course. Further, the student has an option to re-register for the Course and clear the same in the summer term/ subsequent semester if he/she wishes to do so, provided the Course is offered.

13 Additional clarifications - Rules and Guidelines for Transfer of Credits from MOOC, etc. – Note: These are covered in Academic Regulations

The University allows students to acquire credits from other Indian or foreign institutions and/or Massive Open Online Course (MOOC) platforms, subject to prior approval. These credits may be transferred and counted toward fulfilling the minimum credit requirements for the award of a degree. The process of transfer of credits is governed by the following rules and guidelines:

13.1 The transfer of credits shall be examined and recommended by the Equivalence Committee (Refer Annexure B of academic regulations) and approved by the Dean - Academics.

13.2 Students may earn credits from other Indian or foreign Universities/Institutions with which the University has an MOU, and that MOU shall have specific provisions, rules and guidelines for transfer of credits. These transferred credits shall be counted towards the minimum credit requirements for the award of the degree.

13.3 Students may earn credits by registering for Online Courses offered by *Study Web of Active Learning by Young and Aspiring Minds* (SWAYAM) and *National Program on Technology Enhanced Learning* (NPTEL), or other such recognized Bodies/ Universities/Institutions as approved by the concerned BOS and Academic Council from time to time. The concerned School/Parent Department

shall publish/include the approved list of Courses and the rules and guidelines governing such transfer of credits of the concerned Program from time to time. The Rules and Guidelines for the transfer of credits specifically from the Online Courses conducted by SWAYAM/ NPTEL/ other approved MOOCs are as stated in the following Sub-Clauses:

13.3.1 A student may complete SWAYAM/NPTEL/other approved MOOCs as mentioned in Clause 13.3 (as per academic regulations) and transfer equivalent credits to partially or fully complete the mandatory credit requirements of Discipline Elective Courses and/or the mandatory credit requirements of Open Elective Courses as prescribed in the concerned Curriculum Structure. However, it is the sole responsibility of the student to complete the mandatory credit requirements of the Discipline Elective Courses and the Open Elective Courses as prescribed by the Curriculum Structure of the concerned Program.

13.3.2 SWAYAM/NPTEL/ other approved MOOCs as mentioned in Clause 13.3 (as per academic regulations) shall be approved by the concerned Board of Studies and placed (as Annexures) in the concerned PRC.

13.3.3 Parent Departments may release a list of SWAYAM/NPTEL/other approved MOOCs for Pre-Registration as per schedule in the Academic Calendar or through University Notification to this effect.

13.3.4 Students may Pre-Register for the SWAYAM/NPTEL/other approved MOOCs in the respective Departments and register for the same Courses as per the schedule announced by respective Online Course Offering body/institute/ university.

13.3.5 A student shall request for transfer of credits only from such approved Courses as mentioned in Sub-Clause 13.3.2 above.

13.3.6 SWAYAM/NPTEL/other approved MOOCs Courses are considered for transfer of credits only if the concerned student has successfully completed the SWAYAM/NPTEL/other approved MOOCs and obtained a certificate of successful/satisfactory completion.

13.3.7 A student who has successfully completed the approved SWAYAM/NPTEL/ other approved MOOCs and wants to avail the provision of transfer of equivalent credits, must submit the original Certificate of Completion, or such similar authorized documents to the HOD concerned, with a written request for the transfer of the equivalent credits. On verification of the Certificates/Documents and approval by the HOD concerned, the Course(s) and equivalent Credits shall be forwarded to the COE for processing of results of the concerned Academic Term.

13.3.8 The credit equivalence of the SWAYAM/NPTEL/other approved MOOCs are based on Course durations and/or as recommended by the Course offering body/institute/university. The Credit Equivalence mapped to SWAYAM/ NPTEL approved Courses based on Course durations for transfer of credits is summarized in Table shown below. The Grade will be calculated from the marks received by the Absolute Grading Table 8.11 in the academic regulations.

Table 2: Durations and Credit Equivalence for Transfer of Credits from SWAYAM-NPTEL/ other approved MOOC Courses		
Sl. No.	**Course Duration**	**Credit Equivalence**
1	4 Weeks	1 Credit
2	8 Weeks	2 Credits
3	12 Weeks	3 Credits

13.3.9 The maximum permissible number of credits that a student may request for credit transfer from MOOCs shall not exceed 20% of the mandatory minimum credit requirements specified by the concerned Program Regulations and Curriculum for the award of the concerned Degree.

13.3.10 The University shall not reimburse any fees/expense; a student may incur for the SWAYAM/NPTEL/other approved MOOCs.

13.4 The maximum number of credits that can be transferred by a student shall be limited to forty percent (40%) of the mandatory minimum credit requirements specified by the concerned Program Regulations and Curriculum for the award of the concerned Degree. However, the grades obtained in the Courses transferred from other Institutions/MOOCs, as mentioned in this Section (13.0), shall not be included in the calculation of the CGPA.

13.5 Mandatory Non-Credit Course Completion Requirements: All mandatory non-credit courses shall be satisfactorily completed by the student as part of the degree requirements. These courses will be evaluated and awarded letter grades based on the following criteria:

- **S (Satisfactorily Completed):** Awarded when the student successfully completes all prescribed course requirements.
- **NC (Not Completed):** Awarded when the student fails to meet the prescribed course requirements.

A student receiving an NC grade must reappear for and complete the course in accordance with the guidelines prescribed by the University.

In the case of non-taught and non-credited mandatory courses—where students are advised to undertake learning through MOOC platforms—there

shall be a clearly defined **Course Catalogue** and a corresponding Course Plan. The **Course Plan** shall outline the assessment components, which will form the basis for evaluation.

PART B – PROGRAM STRUCTURE

14. Structure / Component with Credit Requirements Course Baskets & Minimum Basket Wise Credit Requirements

The B.Tech. (Aerospace Engineering) Program Structure (2026-30) totaling 160 credits. Table 3 summarizes the type of baskets, number of courses under each basket and the associated credits that are mandatorily required for the completion of the Degree.

Table 3: B.Tech. (Aerospace Engineering) 2026-30: Summary of Mandatory Courses and Minimum Credit Contribution from various Baskets

Sl. No.	Baskets	Credit Contribution
1	Humanities and Social Sciences including Management Courses (HSMC)	10
2	Basic Science Courses (BSC)	24
3	Engineering Science Courses (ESC)	22
4	Professional Core Courses (PCC)	64
5	Professional Elective Courses (PEC)	18
6	Open Elective Courses (OEC)	6
7	Project Work (PRW)	16
8	Mandatory Courses (MAC)	0
	Total Credits	**160**

The curriculum structure is designed as per the CBCS and incorporating OBE Principles. The students are provided with utmost flexibility in selection of the courses of their choice.

15. Minimum Total Credit Requirements of Award of Degree

As per the AICTE guidelines, a minimum of 160 credits is required for the award of a B.Tech. degree.

16. Other Specific Requirements for Award of Degree, if any, as prescribed by the Statutory Bodies,

16.1 The award of the Degree shall be recommended by the Board of Examinations and approved by the Academic Council and Board of Management of the University**.**

16.2 A student shall be declared to be eligible for the award of the concerned Degree if she/he:

a. Fulfilled the Minimum Credit Requirements and the Minimum Credits requirements under various baskets;

b. Secure a minimum CGPA of 4.50 in the concerned Program at the end of the Semester/Academic Term in which she/he completes all the requirements for the award of the Degree as specified in Sub-Clause a of Academic Regulations**;**

c. No dues to the University, Departments, Hostels, Library, and any other such Centers/ Departments of the University; and

d. No disciplinary action is pending against her/him.

PART C: CURRICULUM STRUCTURE

17. Curriculum Structure – Basket Wise Course List of Courses Tabled – aligned to the Program Structure (Course Code, Course Name, Credit Structure (LTPC), Contact Hours (CH), Course Basket, Type of Skills etc., as applicable).

Table 3.1 : List of Humanities and Social Sciences including Management Courses (HSMC)						
S.No	**Course Code**	**Course Name**	**L**	**T**	**P**	**C**
1	ENG1900	English for Technical Communication	2	0	0	2
2	PPS4006	Logical and Critical Thinking	0	0	2	1
3	ENG2501	Advanced English	2	0	0	2
4	FIN1002	Essentials of Finance	3	0	0	3
5	PPS3019	Corporate Communications	0	0	2	1
6	DES1146	Introduction to Design Thinking	1	0	0	1
		Total No. of Credits				**10**

Table 3.2 : List of Basic Science Courses (BSC)						
S. No	**Course Code**	**Course Name**	**L**	**T**	**P**	**C**
1	MAT1211	Linear Algebra, Differential Equations and Statistical Methods	3	1	0	4
2	MAT1214	Calculus, Differential Equations and Vector Analysis	3	1	0	4
3	PHY2503	Fundamentals of Materials Physics	3	0	0	3
4	CHE2505	Materials Chemistry for Engineers	3	0	0	3
5	PHY2506	Fundamentals of Materials Physics Lab	0	0	2	1
6	CHE2506	Materials Chemistry Lab	0	0	2	1
7	MAT2315	Laplace Transform, Complex Variables and Optimization Techniques for Aerospace Engineering	3	1	0	4
8	MAT2304	Numerical Methods, Probability Distribution and Sampling Techniques	3	1	0	4
		Total No. of Credits				**24**

Table 3.3 : List of Engineering Science Courses (ESC)						
S.No	**Course Code**	**Course Name**	**L**	**T**	**P**	**C**
1	CIV1200	Foundations of Integrated Engineering	2	0	0	2
2	MEC1000	Workshop Practice	0	0	2	1
3	MEC1006	Engineering Graphics	2	0	0	2
4	EEE1200	Basics of Electrical and Electronics Engineering	3	0	0	3
5	EEE1251	Basics of Electrical and Electronics Engineering Lab	0	0	2	1
6	MEC2500	Engineering Mechanics	3	0	0	3
7	MEC2505	Mechanics of Solids	3	1	0	4
8	ECE1511	Design Workshop	1	0	2	2
9	CSE2282	Computational Thinking and AI Programming	3	0	0	3
10	CSE2283	Computational Thinking and AI Programming Lab	0	0	2	1
		Total No. of Credits				**22**

Table 3.4 : List of Professional Core Courses (PCC)						
S. No	**Course Code**	**Course Name**	**L**	**T**	**P**	**C**
1	ASE2005	Fundamentals of Aerospace Engineering	3	0	0	3
2	ASE2000	Aero Thermodynamics	3	1	0	4
3	ASE2002	Aero Fluid Mechanics	3	0	0	3
4	ASE2003	Computer Aided Aircraft Component Drawing	0	0	4	2
5	ASE2004	Aircraft Materials	3	0	0	3
6	ASE2005	Aero Fluid Mechanics Lab	0	0	2	1
7	ASE2006	Aero Thermodynamics Lab	0	0	2	1
8	ASE2007	Aero Heat and Mass Transfer	3	0	0	3
9	ASE2009	Basic Aerodynamics	3	0	0	3
10	ASE2010	Aircraft Structures	3	0	0	3
11	ASE2011	Aircraft Materials and Manufacturing Lab	0	0	2	1
12	ASE2012	Aircraft Structures Lab	0	0	2	1
13	MEC2512	Finite Element Analysis	3	0	0	3
14	ASE2026	Aerodynamics	3	0	0	3
15	MEC3063	Control Engineering	3	0	0	3
16	MEC3034	Computer Integrated Manufacturing	3	0	0	3
17	ASE2028	Aerodynamics Lab	0	0	2	1
18	ASE2029	Aircraft Design Lab	0	0	2	1
19	MEC3431	Mechanical Vibrations	3	0	0	3
20	ASE2014	Aerospace Propulsion	3	0	0	3
21	MEC3068	Production and Operations Management	3	0	0	3
22	MEC3032	Energy Conversion Lab	0	0	2	1
23	ASE2017	Propulsion Lab	0	0	2	1
24	ASE2018	Aircraft Stability and Control	3	0	0	3
25	MEC3428	Computational Fluid Dynamics	3	0	0	3
26	ASE2020	Cryogenic Engineering	3	0	0	3
27	ASE2021	Numerical Flow and Structural Analysis Lab	0	0	2	1
28	ASE2022	Aircraft Systems Lab	0	0	2	1
					Total No. of Credits	**64**

Table 3.5 : List of course in Project Work basket (PRW)						
S.No	**Course Code**	**Course Name**	**L**	**T**	**P**	**C**
1	ASE7100	Minor Project	-	-	-	4
2	ASE7000	Internship	-	-	-	2
3	ASE7300	Capstone Project	-	-	-	10
					Total No. of Credits	**16**

Table 3.6 : Mandatory Course						
S.No	**Course Code**	**Course Name**	**L**	**T**	**P**	**C**
1	CHE7601	Environmental Studies	1	0	0	0
2	LAW7601	Indian Constitution	1	0	0	0
3	CIV7601	Universal Human Values and Ethics	1	0	0	0
4	PPS1025	Industry Readiness Program - I	0	0	2	0
5	PPS1026	Industry Readiness Program - II	0	0	2	0
6	APT4002	Introduction to Aptitude	0	0	2	0
7	APT4004	Aptitude Training - Intermediate	0	0	2	0
8	APT4006	Logical and Critical Thinking	0	0	2	0
		Total No. of Credits				0

18. Practical / Skill based Courses – Internships / Thesis / Dissertation / Capstone Project Work / Portfolio / Mini project

Practical / Skill based Courses like internship, project work, capstone project, research project / dissertation, and such similar courses, where the pedagogy does not lend itself to a typical L-T-P-C Structure as defined in Clause 5.1 of the Academic Regulations are simply assigned the number of Credits based on the quantum of work / effort required to fulfill the learning objectives and outcomes prescribed for the concerned Courses. Such courses are referred to as Non-Teaching Credit Courses (NTCC). These Courses are designed to provide students with hands-on experience and skills essential for their professional development. These courses aim to equip students with abilities in problem identification, root cause analysis, problem-solving, innovation, and design thinking through industry exposure and project-based learning. The expected outcomes are first level proficiency in problem solving and design thinking skills to better equip B.Tech. graduates for their professional careers. The method of evaluation and grading for the Practical / Skill based Courses shall be prescribed and approved by the concerned Departmental Academic Committee (refer Annexure A of the Academic Regulations). The same shall be prescribed in the Course Handout.

18.1 Internship

A student may undergo an Internship for a period of 4-6 weeks in an industry / company or academic / research institution during the Semester Break between 4^{th} and 5^{th} Semesters or 6^{th} and 7^{th} Semesters. Alternatively, he/she may complete a 12- to 14-week internship during a full semester (7th or 8th semester) subject to the following conditions:

18.1.1 The Internship shall be in conducted in accordance with the Internship Policy prescribed by the University from time to time.

18.1.2 The selection criteria (minimum CGPA, pass in all Courses as on date, and any other qualifying criteria) as applicable / stipulated by the concerned Industry / Company or academic / research institution for award of the Internship to a student;

18.1.3 The number of Internships available for the concerned Academic Term.

Further, the available number of internships shall be awarded to the students by the University on the basis of merit using the CGPA secured by the student. Provided further, the student fulfils the criteria, as applicable, specified by the Industry / Company or academic / research institution providing the Internship, as stated in Sub-Clause 18.1.2 above.

18.1.4 A student may opt for Internship in an Industry / Company or academic / research institution of her / his choice, subject to the condition that the concerned student takes the responsibility to arrange the Internship on her / his own. Provided further, that the Industry / Company or academic / research institution offering such Internship confirms to the University that the Internship shall be conducted in accordance with the Program Regulations and Internship Policy of the University.

18.1.5 A student selected for an Internship in an industry / company or academic / research institution shall adhere to all the rules and guidelines prescribed in the Internship Policy of the University.

18.2 Project Work

A student may opt to do a Project Work for a period of 4-6 weeks in an Industry / Company or academic / research institution or the University Department(s) as an equivalence of Internship during the Semester Break between 4th and 5th Semesters or 6th and 7th Semesters or during the 5th / 6th / 7th Semester as applicable, subject to the following conditions:

18.2.1 The Project Work shall be approved by the concerned HOD and be carried out under the guidance of a faculty member.

18.2.2 The student may do the project work in an Industry / Company or academic / research institution of her / his choice subject to the above mentioned condition (Sub-Clause 18.2.1). Provided further, that the Industry / Company or academic / research institution offering such project work confirms to the University that the project work will be conducted in accordance with the Program Regulations and requirements of the University.

18.3 Capstone Project

A student may undergo a Capstone Project for a period of 12-14 weeks in an industry / company or academic / research institution in the 7th / 8th Semester as applicable, subject to the following conditions:

18.3.1 The Capstone Project shall be in conducted in accordance with the Capstone Project Policy prescribed by the University from time to time.

18.3.2 The selection criteria (minimum CGPA, pass in all Courses as on date,

and any other qualifying criteria) as applicable / stipulated by the concerned Industry / Company or academic / research institution for award of the Capstone Project to a student;

18.3.3 The number of Capstone Project available for the concerned Academic Term. Further, the available number of Capstone Project shall be awarded to the students by the University on the basis of merit using the CGPA secured by the student. Provided further, the student fulfils the criteria, as applicable, specified by the Industry / Company or academic / research institution providing the Capstone Project, as stated in Sub-Clause 18.3.2 above.

18.3.4 A student may opt for Capstone Project in an Industry / Company or academic / research institution of her / his choice, subject to the condition that the concerned student takes the responsibility to arrange the I Capstone Project on her / his own. Provided further, that the Industry / Company or academic / research institution offering such Capstone Project confirms to the University that the Capstone Project shall be conducted in accordance with the Program Regulations and Capstone Project Policy of the University.

18.3.5 A student selected for a Capstone Project in an industry / company or academic / research institution shall adhere to all the rules and guidelines prescribed in the Capstone Project Policy of the University.

18.4 Research Project / Dissertation

A student may opt to do a Research Project / Dissertation for a period of 12-14 weeks in an Industry / Company or academic / research institution or the University Department(s) as an equivalence of Capstone Project, subject to the following conditions:

18.4.1 The Research Project / Dissertation shall be approved by the concerned HOD and be carried out under the guidance of a faculty member.

The student may do the Research Project / Dissertation in an Industry / Company or academic / research institution of her / his choice subject to the above mentioned condition (Sub-Clause 18.4.1). Provided further, that the Industry / Company or academic / research institution offering such Research Project / Dissertation confirms to the University that the Research Project / Dissertation work will be conducted in accordance with the Program Regulations and requirements of the University.

19.List of Elective Courses under various Specialisations / Stream Basket

Table 3.7: Professional Electives Courses– Minimum of 12 credits is to be earned by the student in a particular track and overall 18 credits.

S.No	Course Code	Course Name	L	T	P	C
1	ASE3200	Drone Technology Design and Analysis	1	0	4	3
2	ASE3201	Green Aviation Technologies	3	0	0	3
3	ASE3202	Smart Materials & Adaptive Structures	3	0	0	3
4	ASE3203	UAV Design & Development	3	0	0	3
5	ASE3204	Embedded Systems for Aerospace	3	0	0	3
6	ASE3205	Artificial Intelligence in Aerospace	3	0	0	3
7	ASE3206	Aircraft Communication Systems	3	0	0	3
8	ASE3207	Cybersecurity in Aviation	3	0	0	3
9	ASE3210	Guidance, Navigation & Control	3	0	0	3
10	ASE3211	Drone Regulations & Airworthiness	3	0	0	3
11	ASE3212	Lightweight Structures Design	3	0	0	3
12	ASE3213	Digital Twin in Aerospace Systems	3	0	0	3
13	ASE3214	Defense Avionics Systems	3	0	0	3
14	ASE3215	Aircraft Maintenance Engineering Concepts	3	0	0	3
15	ASE3216	Drone Mapping & Surveying Technologies	3	0	0	3
16	ASE3217	Lightweight Structures Design	3	0	0	3
17	ASE3218	Bio-inspired Aerodynamics	3	0	0	3
18	MEC3038	Smart Manufacturing	3	0	0	3
19	MEC3009	Nanotechnology	3	0	0	3
20	MEC3055	Product Design for Manufacture and Assembly	3	0	0	3
21	MEC3051	Fracture Mechanics	3	0	0	3
22	MEC3255	Additive Manufacturing	3	0	0	3
23	MEC3049	Mechanics of Composite Materials	3	0	0	3

20.List of Open Electives to be offered by the School / Department (Separately for ODD and EVEN Semesters.

Sl. No.	Course Code	Course Name	L	T	P	C	Anti-requisites
Chemistry Basket							
1	CHE3001	Smart Materials and 3D Printing	3	0	0	3	-
2	CHE3002	Energy and Sustainability	3	0	0	3	-
3	CHE3003	Nano technology and its applications	3	0	0	3	-
4	CHE3004	Corrosion and control	3	0	0	3	-
5	CHE3005	Green Chemistry and Sustainable Technology	3	0	0	3	-
6	CHE3006	Food Technology	3	0	0	3	-
Civil Engineering Basket (not to be offered for Civil Engineering Department students)							
1	CIV3100	Disaster mitigation and management	3	0	0	3	-

Sl. No.	Course Code	Course Name	L	T	P	C	Anti-requisites
2	CIV3101	Sustainability Concepts in Engineering	3	0	0	3	-
3	CIV3102	Occupational Health and Safety	3	0	0	3	-
4	CIV3103	Sustainable Materials and Green Buildings	3	0	0	3	-
5	CIV3104	Integrated Project Management	3	0	0	3	-
6	CIV3105	Environmental Impact Assessment	3	0	0	3	-
7	CIV3106	Infrastructure Systems for Smart Cities	3	0	0	3	-
8	CIV3107	Geospatial Applications for Engineers	2	0	2	3	-
9	CIV3108	Environmental Meteorology	3	0	0	3	-
10	CIV3109	Project Problem Based Learning	3	0	0	3	-
11	CIV3110	Sustainability for Professional Practice	3	0	0	3	-
Commerce Basket							
1	MGT2015	Engineering Economics	3	0	0	3	-
2	MGT2020	Marketing Fundamentals for Engineers	3	0	0	3	-
3	MGT2021	Finance for Engineers	3	0	0	3	-
4	MGT2007	Digital Entrepreneurship	3	0	0	3	-
5	COM1020	Business Accounting & Financial Analysis	2	1	0	3	-
6	BBA2088	Management and Behavioral Practices	3	0	0	3	-
Design Basket							
1	DES2001	Design Thinking	3	0	0	3	-
Electrical and Electronics Basket							
1	EEE3100	IoT based Smart Building Technology	3	0	0	3	-
2	EEE3101	Basic Circuit Analysis	3	0	0	3	-
3	EEE3102	Fundamentals of Industrial Automation	3	0	0	3	-
4	EEE3103	Electric Vehicles & Battery technology	3	0	0	3	-
5	EEE3104	Smart Sensors for Engineering Applications	3	0	0	3	-
Electronics and Communication Engineering Basket							
1	ECE3800	Fundamentals of Electronics	3	0	0	3	-
2	ECE3801	Microprocessor based systems	3	0	0	3	-
3	ECE3802	Artificial Neural Networks	3	0	0	3	-
4	ECE3803	Smart Electronics in Agriculture	3	0	0	3	-
5	ECE3804	Environment Monitoring Systems	3	0	0	3	-
6	ECE3805	Consumer Electronics	3	0	0	3	-
7	ECE3806	Product Design of Electronic Equipment	3	0	0	3	-
8	ECE3807	Introduction to Data Analytics	3	0	0	3	-
9	ECE3808	Machine Vision for Robotics	3	0	0	3	-
English Basket							
1	ENG1906	Law and Crime in Popular Imagination	3	0	0	3	-
2	ENG1909	Exploring Gender: Narratives from Campus to Community	3	0	0	3	-
3	ENG1910	Trauma Narratives: From Page to Pixel	3	0	0	3	-
4	ENG1911	'Nonsense' Across Media	3	0	0	3	-
5	ENG1912	Language and Interpretation	3	0	0	3	-
Law Basket							
1	LAW2015	Cyber Law	3	0	0	3	-
2	LAW5005	Law relating to Infrastructure Projects	3	0	0	3	-
Mathematics Basket							

Sl. No.	Course Code	Course Name	L	T	P	C	Anti-requisites
1	MAT3030	Optimization Techniques for Engineers	3	0	0	3	-
2	MAT3031	Basic Statistics & Data Analysis	3	0	0	3	-
3	MAT3032	Mathematics for Machine Learning	3	0	0	3	-
4	MAT3033	Bioinformatics & Computational Biology	3	0	0	3	-
5	MAT3034	Time-Frequency Transforms for Signal Analysis	3	0	0	3	-
6	MAT3035	Mathematical Modelling	3	0	0	3	-
7	MAT3036	Bio-Statistics and Bio-Modelling	3	0	0	3	-
8	MAT3037	Linear Algebra & Matrix Theory	3	0	0	3	-
9	MAT3038	Financial Mathematics	3	0	0	3	-
10	MAT3039	Fuzzy Logic & Neural Networks	3	0	0	3	-
11	MAT3040	Discrete Mathematics	3	0	0	3	-
Media Studies Basket							
1	BAJ3006	Brand Management	3	0	0	3	-
2	BAJ3007	Communication for Social Impact	3	0	0	3	-
3	BAJ3035	Business Journalism	3	0	0	3	-
4	BAJ3017	Political Communication	3	0	0	3	-
5	BAJ3042	Media Literacy Education	3	0	0	3	-
Mechanical Basket							
1	MEC3250	Engineering Drawing	1	0	4	3	-
2	MEC3251	Supply Chain Management	3	0	0	3	-
3	MEC2004	Six Sigma for Professionals	3	0	0	3	-
4	MEC2006	Safety Engineering	3	0	0	3	-
5	MEC3256	Sustainable Technologies and Practices	3	0	0	3	-
6	MEC3257	Industry 4.0	3	0	0	3	-
Petroleum Basket							
1	PET3301	Energy Industry Dynamics	3	0	0	3	-
2	PET3302	Energy Sustainability Practices	3	0	0	3	-
Management Basket – I (One Course to be opted as part of HSMC Basket)							
1	MGTXXXX	Managerial Economics and Finance	3	0	0	3	-
2	MGT2004	Development of Enterprises	3	0	0	3	-
3	MGT2010	Managing People and Performance	3	0	0	3	-
4	MGT2020	Marketing for Engineers	3	0	0	3	-

21. List of MOOC (NPTEL) Courses

21.1 NPTEL - Discipline Elective Courses for B. Tech. (Aerospace Engineering)

Sl. No.	Course ID	Course Name	Duration
1	noc25-ge54	Sustainable Power Generation Systems	12 Weeks
2	noc25-me162	Microfluidics and Nanofluidics	12 Weeks
3	noc25-me167	Energy Conservation and Waste Heat Recovery	12 Weeks
4	noc25-me177	Microrobotics	12 Weeks
5	noc25-me180	Design of Precision Machines	12 Weeks

21.2 NPTEL - Open Elective Courses for B. Tech. (Aerospace Engineering)

Sl. No.	Course ID	Course Name	Duration
1	noc25-me110	Explosions and Safety	12 Weeks
2	noc25-me125	Rapid Manufacturing	12 Weeks
3	noc25-me133	Compliant Mechanisms: Principles and Design	12 Weeks
4	noc25-me142	Mathematical Modeling of Manufacturing Processes	12 Weeks

22. Recommended Semester Wise Course Structure / Flow including the Program / Discipline Elective Paths / Options

Semester 1 (Physics Cycle)								
S. NO.	COURSE CODE	COURSE NAME	CREDIT STRUCTURE					BASKET
			L	T	P	C	CH	
1	ENG1030	Fundamentals of Communication	1	0	2	2	3	HSMC
2	MAT1211	Linear Algebra, Differential Equations and Statistical Methods	3	1	0	4	4	BSC
3	PHY2503	Fundamentals of Materials Physics	3	0	0	3	3	BSC
4	MEC1006	Engineering Graphics	2	0	0	2	2	ESC
5	MEC2500	Engineering Mechanics	3	0	0	**3**	3	ESC
6	ECE1512	Design Thinking in Practice	2	0	2	3	4	ESC
7	PHY2506	Fundamentals of Materials Physics Lab	0	0	2	1	2	BSC
8	PPS1025	Industry Readiness Program – I	0	0	2	0	2	MAC
TOTAL			**14**	**1**	**8**	**18**	**23**	**-**

Semester 2

S. NO.	COURSE CODE	COURSE NAME	CREDIT STRUCTURE					BASKET
			L	T	P	C	CH	
1	ENG2030	Communication in Practice	1	0	2	2	3	HSMC
2	MAT1214	Calculus, Differential Equations and Vector Analysis	3	1	0	4	4	BSC
3	CHE2505	Materials Chemistry for Engineers	3	0	0	3	3	BSC
4	EEE1200	Basics of Electrical and Electronics Engineering	3	0	0	3	3	ESC
5	MEC1000	Workshop Practice	0	0	2	**1**	2	ESC
6	MEC2005	Fundamentals of Aerospace Engineering	3	0	0	**3**	3	PCC
7	CIV1200	Foundations of Integrated Engineering	2	0	0	2	**2**	ESC
8	CHE2506	Materials Chemistry Lab	0	0	2	1	2	BSC
9	EEE1251	Basics of Electrical and Electronics Engineering Lab	0	0	2	1	2	ESC
10	PPS1026	Industry Readiness Program – II	0	0	2	0	2	MAC
TOTAL			**15**	**1**	**10**	**20**	**26**	

Semester 3								
S. NO.	COURSE CODE	COURSE NAME	CREDIT STRUCTURE					BASKET
			L	T	P	C	CH	
1	MAT2315	Laplace Transform, Complex Variables and Optimization Techniques for Aerospace Engineering	3	1	0	4	4	BSC
2	ASE2000	Aero Thermodynamics	3	1	0	4	4	PCC
3	MEC2505	Mechanics of Solids	3	1	0	4	4	ESC
4	ASE2002	Aero Fluid Mechanics	3	0	0	3	3	PCC
5	ASE2003	Computer Aided Aircraft Component Drawing	0	0	4	2	4	PCC
6	ASE2004	Aircraft Materials	3	0	0	3	3	PCC
7	ASE2005	Aero Fluid Mechanics Lab	0	0	2	1	2	PCC
8	ASE2006	Aero Thermodynamics Lab	0	0	2	1	2	PCC
9	FIN1002	Essentials of Finance	3	0	0	3	3	HSMC
10	CIV7601	Universal Human Values and Ethics	1	0	0	0	1	-
11	APT4002	Introduction to Aptitude	0	0	2	0	2	MAC
TOTAL			**19**	**3**	**10**	**25**	**32**	

Semester 4								
S. NO.	COURSE CODE	COURSE NAME	CREDIT STRUCTURE					BASKET
			L	T	P	C	CH	
1	MAT2304	Numerical Methods, Probability Distributions and Sampling	3	1	0	4	4	BSC

		Techniques						
2	ASE2007	Aero Heat and Mass Transfer	3	0	0	3	3	PCC
3	ASE2009	Basic Aerodynamics	3	0	0	3	3	PCC
4	ASE2010	Aircraft Structures	3	0	0	3	3	PCC
5	ASE2011	Aircraft Materials and Manufacturing Lab	0	0	2	1	2	PCC
6	CSE2282	Computational Thinking and AI Programming	3	0	0	3	3	ESC
7	CSE2283	Computational Thinking and AI Programming Lab	0	0	2	1	2	ESC
8	ASE2012	Aircraft Structures Lab	0	0	2	1	2	PCC
9	APT4004	Aptitude Training - Intermediate	0	0	2	0	2	MAC
10	CHE7601	Environment Studies	1	-	-	0	1	MAC
TOTAL			**16**	**1**	**8**	**19**	**25**	**-**

Semester 5								
S. NO.	COURSE CODE	COURSE NAME	CREDIT STRUCTURE					BASKET
			L	T	P	C	CH	
1	MEC2512	Finite Element Analysis	3	0	0	3	3	PCC
2	ASE2026	Aerodynamics	3	0	0	3	3	PCC
3	MEC3063	Control Engineering	3	0	0	3	3	PCC
4	MEC3034	Computer Integrated Manufacturing	3	0	0	3	3	PCC
5	ASEXXXX	Professional Elective – I	3	0	0	3	3	PEC
6	ASEXXXX	Professional Elective – II	3	0	0	3	3	PEC
7	ASE2028	Aerodynamics Lab	0	0	2	1	2	PCC
8	APT4006	Logical and Critical Thinking	0	0	2	0	2	MAC
9	ASE7100	Minor Project	-	-	-	4	-	PRW
10	ASE2029	Aircraft Design Lab	0	0	2	1	2	
TOTAL			**18**	**0**	**6**	**24**	**24**	

Semester 6								
S. NO.	COURSE CODE	COURSE NAME	CREDIT STRUCTURE					BASKET
			L	T	P	C	CH	
1	MEC3431	Mechanical Vibrations	3	0	0	3	3	PCC

2	ASE2014	Aerospace Propulsion	3	0	0	3	3	PCC
3	MEC3068	Production and Operations Management	3	0	0	3	3	PCC
4	MEC3032	Energy Conversion Lab	0	0	2	1	2	PCC
5	ASE2017	Propulsion Lab	0	0	2	1	2	PCC
6	ASEXXXX	Professional Elective - III	3	0	0	3	3	PEC
7	ASEXXXX	Professional Elective - IV	3	0	0	3	3	PEC
8	APT4005	Aptitude for Employability	0	0	2	1	2	HSMC
9	XXXXXXX	Open Elective – I	3	0	0	3	3	OEC
10	LAW7601	Indian Constitution	1	0	0	0	1	MAC
TOTAL			**19**	**0**	**6**	**21**	**25**	**-**

Semester 7								
S. NO.	COURSE CODE	COURSE NAME	CREDIT STRUCTURE					BASKET
			L	T	P	C	CH	
1	ASE2018	Aircraft Stability and Control	3	0	0	3	3	PCC
2	MEC3428	Computational Fluid Dynamics	3	0	0	3	3	PCC
3	ASE2020	Cryogenic Engineering	3	0	0	3	3	PCC
4	ASEXXXX	Professional Elective – V	3	0	0	3	3	PEC
5	ASEXXXX	Professional Elective – VI	3	0	0	3	3	PEC
6	XXXXXXX	Open Elective – II	3	0	0	3	3	OEC
7	ASE7000	Internship	-	-	-	2	-	PRW
8	PPS3018	Preparedness for Interview	0	0	2	1	2	HSMC
9	ASE2021	Numerical Flow and Structural Analysis Lab	0	0	2	1	1	PCC
10	ASE2022	Aircraft Systems Lab	0	0	2	1	2	PCC
TOTAL			**18**	**0**	**6**	**23**	**23**	

Semester 8				
S.	COURSE	COURSE NAME	CREDIT STRUCTURE	BASKET

NO.	CODE		L	T	P	C	CH	
1	ASE7300	Capstone Project	-	-	-	10	0	PRW
TOTAL						**10**	**0**	

23. Course Catalogue

Course Catalogue of all Courses Listed including the Courses Offered by other School / Department and Discipline / Program Electives – Course Code, Course Name, Prerequisite, Anti-requisite, Course Description, Course Outcome, Course Content (with Blooms Level, CO, No. of Contact Hours), Reference Resources.

Course Catalogues:

Course Code: MAT1211	**Course Title: Linear Algebra, Differential Equations and Statistical Methods** **Type of Course:1] School Core**	**L-T- P-C**	**3**	**1**	**0**	**4**
Version No.	1.0					
Course Pre-requisites	NIL					
Anti-requisites	NIL					
Course Description	This course introduces fundamental mathematical concepts from linear algebra, differential calculus, ordinary differential equations and statistics. The content includes matrices, systems of linear equations, eigenvalues and eigenvectors, functions of several variables, differential equations, correlation and regression analysis, and curve fitting techniques. The course combines theoretical developments with illustrative applications drawn from scientific and engineering settings. The course emphasizes the application of these mathematical tools in solving problems in science and engineering. It extends student's problem-solving abilities through analytical and computational approaches, with focus on both theoretical understanding and applications.					
Course Objective	The objective of this course is to provide students with a strong mathematical foundation required for engineering and scientific studies. The course introduces fundamental concepts from linear algebra, differential calculus, ordinary differential equations, and statistical methods that are widely used in modeling, analysis and problem solving. It aims to familiarize students with mathematical techniques for representing engineering systems, studying relationships among variables, describing dynamic processes and interpreting data. The course serves as a foundation to prepare students for advanced engineering subjects that rely on mathematical modeling, computation and analytical methods.					
Course Out Comes	On successful completion of the course the students shall be able to: **CO1:** Use linear algebra concepts to evaluate properties of matrices and quadratic forms. (L3) **CO2:** Apply matrix-based methods to solve systems of linear equations. (L3) **CO3:** Use fundamental theorems and analytical techniques of differential calculus to single variable functions. (L3) **CO4:** Apply the concepts of partial derivatives to multivariable functions. (L3) **CO5:** Solve first order ordinary differential equations using analytical methods. (L3) **CO6:** Employ statistical techniques for data analysis and to interpret relationships between variables. (L3)					

Course Content:		
Module 1	**Fundamentals of Linear Algebra**	**(15L+5T=20 Sessions)**
Matrices, echelon forms, rank of matrix, Systems of linear equations: Consistency, solution to system of linear homogeneous and non-homogeneous equations- Gauss elimination method, Gauss-Jordan method (Self-study), LU decomposition method, Network analysis using linear systems, Design of traffic patterns, Electrical circuits. Eigenvalue and eigenvector, diagonalization of symmetric matrices, quadratic forms.		
Module 2	**Differential Calculus**	**(15L+5T=20 Sessions)**
Introduction, limit, continuity, Rolle's theorem, mean value theorems, Indeterminate forms and L'Hôpital's rule. Partial derivatives, Euler's theorem, total derivative, Jacobians, Taylor's and Maclaurin's theorems, maxima, minima and saddle points, method of Lagrange multipliers, Current Growth in an RL Circuit, Velocity Estimation, Fuel consumption optimization, Cost function optimization.		
Module 3	**Ordinary Differential Equations**	**(6L+2T=8 Sessions)**
Definition, types of differential equations-variable separable, homogeneous, exact, linear and Bernoulli's equations, Equations not of first degree: equations solvable for p, equations solvable for y, equations solvable for x and Clairaut's type, Newton's law of cooling, Current in RL circuit.		
Module 4	**Statistical Methods and Curve Fitting**	**(9L+3T=12 Sessions)**
Measures of central tendency, moments, skewness, and kurtosis. Correlation - Karl Pearson's coefficient of correlation, rank correlation, multiple correlation. Regression analysis - lines of regression, multiple regression. Principle of least square, curve fitting- straight line, parabola and exponential curves, Stress and strain curve fitting, Feature selection and Prediction models.		
Targeted Applications & Tools that can be used: • Linear Algebra is applied to solve systems of equations in circuits, traffic flow, and network analysis, with eigenvalues and quadratic forms aiding stability and optimization studies. • Differential Calculus supports process speed analysis, velocity estimation, and optimization techniques such as minimizing fuel consumption and cost functions. • Differential Equations model dynamic behaviours like current in RL circuits, heat transfer in materials, and growth or decay in environmental and nuclear engineering. • Statistical Methods and Curve Fitting enable effective data analysis through correlation, regression, and curve fitting, supporting predictive modeling and interpretation of experimental data such as stress-strain relationships. Software: MATLAB, Python, R Programming, Mathematica, Scilab, Octave		
Assignment:		
Select any one simple differential equation pertaining to the respective branch of engineering, identify the dependent and independent variable – obtain the solution and compare the solution sets by varying the values of the dependent variable.		
Text Book		

1. B. S. Grewal, *Higher Engineering Mathematics*, 44th ed. New Delhi, India: Khanna Publishers, 2017.
2. D. C. Montgomery and G. C. Runger, *Applied Statistics and Probability for Engineers*, 7th ed. Hoboken, NJ, USA: Wiley, 2018.

References:

1. P. V. O'Neil, *Advanced Engineering Mathematics*, 8th ed. Boston, MA, USA: Cengage Learning, 2018.
2. R. I. Miller and J. E. Freund, *Probability and Statistics for Engineers*, 9th ed. Noida, India: Pearson Education Ltd., 2017.
3. E. Kreyszig, *Advanced Engineering Mathematics*, 10th ed. Hoboken, NJ, USA: John Wiley & Sons, 2011.
4. V. Henner, T. Belozerova, and M. Khenner, *Ordinary and Partial Differential Equations*. Boca Raton, FL, USA: CRC Press, 2013.

E-resources/ Web links:

1. https://nptel.ac.in/courses/111105121
2. https://nptel.ac.in/courses/111106146
3. https://presiuniv.knimbus.com/user#/viewDetail?searchResultType=ECATALOGUE_BASED&unique_id=EBSCO95_30102024_106839
4. https://presiuniv.knimbus.com/user#/viewDetail?searchResultType=ECATALOGUE_BASED&unique_id=EBSCO95_30102024_61605
5. https://presiuniv.knimbus.com/user#/viewDetail?searchResultType=ECATALOGUE_BASED&unique_id=EBSCO95_30102024_134719
6. https://presiuniv.knimbus.com/user#/viewDetail?searchResultType=ECATALOGUE_BASED&unique_id=TEXTBOOK_LIBRARY01_06082022_174

Topics relevant to SKILL DEVELOPMENT: The course focuses on the concepts of differential calculus, differential equations and statistical methods with reference to specific engineering problems. The course is of both conceptual and analytical type in nature through Problem solving. This is attained through the assessment component mentioned in course handout.

Catalogue prepared by	**Dr. Kavita Permi, Dr. Rahul M. P. and Dr. Athmakoori Prashant**
Recommended by the Board of Studies on	
Date of Approval by the Academic Council	

Course Code: **CIV1200**	**Course Title: Foundations of Integrated Engineering** **Type of Course: Engineering Science Course**	**L-T-P-C**	2	0	0	2
Version No.	1.0					
Course Pre-requisites	**NIL**					
Anti-requisites	**NIL**					
Course Description	This interdisciplinary course introduces first-year engineering students to foundational principles and practices across key engineering domains, emphasizing real-world problem-solving, sustainability, and ethical innovation. Students explore how civil, mechanical, electrical, and IT systems intersect with emerging technologies like IoT, AI, and geomatics to address global challenges. Through case studies, learners gain deeper understanding of smart infrastructure, prototyping mechanical/electronic systems, and securing IT solutions. Topics include bioinformatics for environmental monitoring, GIS-enabled urban planning, renewable energy integration, and cybersecurity fundamentals. The course cultivates a holistic understanding of engineering's role in sustainable development, safety, and ethical decision-making, preparing students to contribute meaningfully to multidisciplinary projects in a technology-driven world.					
Course Objective	The objective of the course is skill development of student by using Participative Learning techniques.					
Course Outcomes	On successful completion of this course the students shall be able to: CO1] Recall key principles of Agile, DevOps, and bioinformatics used in interdisciplinary engineering contexts. CO2] Explain the role of GIS, LiDAR, and sustainable materials in designing smart infrastructure and disaster management systems. CO3] Describe core components of mechanical systems and their real-world applications. CO4] Describe the functionality of IoT-enabled wearable devices, embedded systems, and renewable energy integration in smart grids. CO5] List foundational IT concepts such as cloud computing architectures, cybersecurity threats, and blockchain applications.					
Course Content:						
Module 1	Foundations of Engineering Practice	Assignment	Case studies	6 Sessions		
Real-world problem-solving using data logic and practical applications, Collaboration and Innovation through multi-domain project, Engineering Ethics & Environmental Impact Emerging Fields: Automation, and Introduction to bioinformatics and its application Sustainability & Safety: Circular economy principles, carbon footprint analysis.						
Module 2	Civil Engineering & Geomatics	Assignment	Article Review	6 Sessions		
Smart Infrastructure & Geomatics: GIS mapping, LiDAR, drone surveys for urban planning, Geospatial data analysis for disaster management. Sustainable Construction: 3D-printed structures, self-healing concrete, Digital twins for						

infrastructure monitoring. Green Innovations: Net-zero energy buildings, rainwater harvesting systems.				
Module 3	Mechanical Engineering in Action	Assignment & Quiz	Data Collection	6 Sessions
Advanced Manufacturing: Collaborative robots (cobots), additive manufacturing and 3D printing, Reverse engineering and prototyping. Energy Systems: Solar/wind energy harvesting, piezoelectric applications. Biomechanics: Prosthetics design, ergonomic product lifecycle.				
Module 4	Electrical & Electronics Engineering	Assignment & Quiz	Data Collection and visualization	6 Sessions
Smart Devices & Systems: Embedded systems, Wearable technology, Edge computing and hardware platforms Energy Innovations: EV charging infrastructure, wireless power transfer, Smart grid integration with renewables.				
Module 5	Fundamentals of IT	Assignment & Quiz	Case studies	5 Sessions
Core IT Topics: Networking basics, Cloud computing Cybersecurity & Data: Encryption, phishing prevention, zero-trust models, Database management. Emerging Tech: Blockchain for supply chains, AI/ML basics, IoT integration with cloud platforms				
Targeted Application & Tools that can be used: Application Areas include Interdisciplinary problem-solving, Smart city planning, disaster management, Robotics prototyping, renewable energy systems, Wearable health tech, smart grids, Secure cloud systems. Tools: 3D Printers, Autocad, Tinkercad, ArcGIS / QGIS, Arduino/Raspberry Pi				
Text Book: 1. William Oakes & Les Leone, "Engineering Your Future: An Introduction to Engineering", Oxford University Press, 9th Edition, 2021 2. Barry F. Kavanagh, "Introduction to Geomatics", Pearson, 5th Edition, 2021 3. Ian Gibson, David Rosen, & Brent Stucker, "Additive Manufacturing Technologies", Springer, 3rd Edition, 2021 4. Sudip Misra, "The Internet of Things: Enabling Technologies, Protocols, and Use Cases", Wiley, 2nd Edition, 2022 5. James Kurose & Keith Ross, "Computer Networking: A Top-Down Approach", Pearson, 8th Edition, 2020				
References 1. Supratim Choudhuri, "Bioinformatics for Beginners: Genes, Genomes, and Molecular Evolution", Academic Press, 1st Edition, 2023, 2. Robert McGinn, "The Ethical Engineer: Contemporary Concepts and Cases", Princeton University Press, 1st Edition, 2020 3. Charles J. Kibert, "Sustainable Construction: Green Building Design and Delivery", Wiley, 5th Edition, 2022 4. Anthony M. Townsend, "Smart Cities: Big Data, Civic Hackers, and the Quest for a New Utopia", W.W. Norton & Company, 1st Edition, 2020 5. David Buchla, "Renewable Energy Systems: A Smart Energy Systems Approach", Pearson, 2nd Edition, 2023 6. Charles Platt, "Make: Electronics: Learning Through Discovery", Make Community, 3rd Edition, 2021 7. Charles J. Brooks, Christopher Grow, & Philip Craig, "Cybersecurity Essentials", Wiley, 2nd Edition, 2021				
Web-resources: 1. Post-parametric Automation in Design and Construction				

https://search.ebscohost.com/login.aspx?direct=true&db=nlebk&AN=1155197&site=ehost-live

2. Smart Cities : Introducing Digital Innovation to Cities

https://search.ebscohost.com/login.aspx?direct=true&db=nlebk&AN=1993146&site=ehost-live

3. Innovation Energy: Trends and Perspectives or Challenges of Energy Innovation

https://search.ebscohost.com/login.aspx?direct=true&db=nlebk&AN=2323766&site=ehost-live

4. Additive Manufacturing: Opportunities, Challenges, Implications

https://search.ebscohost.com/login.aspx?direct=true&db=nlebk&AN=1134464&site=ehost-live

Catalogue prepared by	Dr. Nakul Ramanna, Dr. Rajiv Ranjan Singh, Mr. N. Gopalakrishnan, Mr. Ajay H A

Course Code: MEC1000	**Course Title:** Workshop Practice **Type of Course:** Engineering Science Course	**L-T-P-C**	**0**	**0**	**2**	**1**
Version No.	1.0					
Course Pre-requisites	NIL					
Anti-requisites	NIL					
Course Description	The primary objective of this course is to expose students to the basic skills in handling various tools in a workshop and cover some of the processes used for converting raw materials to finished products. It is a practical oriented Course detailing about various hand tools and conventional manufacturing processes. This course trains the student to manufacture the components using fitting, sheet metal, Arc welding and Soldering. Also, the course introduces basic workshop concepts which include Plumbing, Basic metrology and Electrical circuits					
Course Objective	The objective of the course is to familiarize the learners with the concepts of "**Workshop Practice**" and attain SKILL DEVELOPMENT through Experiential learning techniques.					
Course Outcomes	On successful completion of this course the students shall be able to: CO1: **Demonstrate** the use of hand tools to machine workpieces to desired dimensions and achieve proper fits through fitting operations. CO2: **Apply** the principles and applications of electric arc welding to create various types of welded joints. CO3: **Apply** the working techniques of sheet metal tools to fabricate different types of sheet metal components. CO4: **Apply** basic workshop practices including plumbing, metrology, and electrical wiring relevant to household and industrial CO5: **Demonstrate** safe working practices and follow standard operating procedures across all workshop sections. CO6: **Interpret** engineering drawings and specifications to carry out workshop tasks with accuracy and precision.					
Course Content:						

Syllabus:

Introduction to basic workshop lab:

All the safety and precaution parameters to be explained. Use of Vernier caliper, Screw gauge and Vernier height gauge will be explained

Preparation of Fitting Model: Explanation to different types of files, try square, hacksaw blade, etc. To cut and file metallic plates to given dimensions in order to make a suitable fit.

Preparation of Sheet Metal Model: Explanation of sheet metal cutting machine, sheet metal thickness measurements, applications, SWG, cutting techniques. Sheet bending & forming technique and tools used for the same.

Preparation of Welding Model: Explanation about welding theory, safety precautions to be adopted, welding machine, tools & accessories, polarity, electrodes, welding positions , various joints, applications etc.

Demonstration:

Plumbing: Explanation of different types of pipes, pipeline connections, holding devices, valves and pipe accessories

Metrology: Measurement of dimensions such as length, inner and outer diameter, depth etc. by using Vernier Caliper and Micrometer
Electrical Circuits: Electrical connections and wiring involved

Targeted Application & Tools that can be used:

Textook:

1. B. S. Nagendra Parashar, R. K. Mittal, "Elements of Manufacturing Processes," Prentice Hall of India .

Reference:

2. S. K. Hajra Choudhury, "Elements of Workshop Technology - Volume I - Manufacturing Processes,"Media Promoters and Publishers Pvt. Ltd .

Course Material:

"Basic Workshop Lab Manual," Presidency University

Web Resources:

https://presiuniv.knimbus.com/user#/searchresult?searchId=elements%20of%20Mechanical%20Engineering&_t=1659588753433

Topics relevant to "SKILL DEVELOPMENT": Manufacturing processes with machines tools, welding types and process for **SKILL DEVELOPMENT** through **Experiential Learning techniques**. This is attained through assessment component mentioned in course handout.

Catalogue prepared by	Dr. Madhusudhan M

Course Code: CHE2505	**Course Title: Materials Chemistry for Engineers** **Type of Course: Basic Sciences course**	L- T-P- C	3	0	0	3
Version No.	1.0					
Course Pre-requisites	Fundamental Knowledge of Chemistry					
Anti-requisites	NIL					
Course Description	The primary objective of the course is to introduce the students to the fundamental concepts and applications of materials chemistry in Engineering. The course also aims to enhance the knowledge of chemical composition of materials, their properties and recent method for the preparation of the materials for various engineering applications. The course further seeks to cultivate the ability to recognize the role of chemistry in smart engineered products used in households and industry. It targets to strengthen the fundamental concepts of chemistry and materials then builds an interface with their industrial applications. This course is designed to cater to Environment and Sustainability					
Course Objective	The objective of the course is to familiarize the learners with the concepts of **'Materials Chemistry for Engineers'** and attain **'Skill Development'** through **'Participative Learning'** techniques**.**					
Course Outcomes	On successful completion of this course the students shall be able to: CO1. Recognize the principles of water chemistry to develop innovative solutions in water technology. CO2. Describe the general introduction of nanomaterials for water treatment and industrial processes. CO3. Summarize the importance of various chemical and electrochemical sources in modern energy systems. CO4. Relate the knowledge of electrochemical principles for protection of different metals from corrosion. CO5. Identify the suitable polymers to replace the conventional materials.					
Course Content:						
Module 1	Water Chemistry and Nano technology	Assignment/Quiz	Data Collection and analysis	13 Sessions		
Water technology: Introduction to water chemistry, Hardness of water: types, causes and numerical problems, disadvantages of hard water, Boiler feed water and common boiler troubles, Potable water- Standards and Specifications, Treatment of water for municipal supply, Desalination by Reverse osmosis and ion exchange process, Waste water analysis- Chemical Oxygen Demand (COD) and Dissolved Oxygen (DO) estimation using Winkler's method, Sewage treatment: Primary, Secondary and Tertiary processes. **Nanomaterials:** Introduction to nanoscience and nanomaterials, size-dependent properties of nanomaterials, Classification of nanomaterials: Carbon Nanotubes (CNTs), Nanorods, Nanotubes, Fullerenes, Nanocomposites, Carbon Nanofibres, Nanowires, and Nanopowders, synthesis of nanomaterials by Top-down and Bottom-up approaches, Properties and applications of graphene and carbon nanotubes, Softening of industrial wastewater by Nanofiltration techniques, Advantages and future scope of nanomaterials in water treatment.					
Module 2	Chemical and Electrochemical energy	Assignment/Quiz	Data collection	12 Sessions		

	sources			

Chemical energy sources: Definition and classification of fuels, Characteristics of good fuels, calorific value, Gross and net calorific value, Bomb Calorimeter-numerical problems, Fractional distillation of petroleum, Knocking and octane number, cetane number, Cracking of petroleum, Fluid Catalytic Cracking (FCC).

Electrochemical energy sources: Introduction to electrochemistry, basic concepts of batteries and characteristics, Classification of batteries –Primary battery: Dry cell and Li-MnO_2, Secondary battery- Pb-acid, Ni-MH and Lithium-ion batteries. Supercapacitor: classification, construction and applications in hybrid vehicles, Fuel cells: hydrogen-oxygen and Methanol-oxygen fuel cells: Principle, working mechanism and their applications.

Module 3	Corrosion and metal finishing	Assignment/Seminar	Data collection and analysis	09 Sessions

Introduction to Corrosion – Reasons for corrosion, Effects of corrosion, Types of Corrosion, Electrochemical theory of corrosion, Differential metal Corrosion, Differential aeration Corrosion and cases, and Stress Corrosion. Factors that affecting the rate of corrosion- Primary and Secondary Factors.
Corrosion Control Methods–Design and selection, Protective Coatings-Anodic and Cathodic coatings, Cathodic protection- Sacrificial anodic methods and impressed current method, Inorganic Coatings-Anodizing.
Metal Finishing- Importance, Techniques, electroplating (Cr and Ni), Difference between electroplating and electroless plating, electroless plating of Cu on PCBs.

Module 4	Macromolecules as engineering materials	Assignment/Seminar	Data collection and analysis	11 Sessions

Polymers: Introduction, Classifications, Types of Polymerization: Addition and Condensation polymerization, Degree of polymerization, Molecular weight of the polymers – numerical, Thermoplastics & thermosetting polymers. Preparation, properties, and applications of industrially important polymers - Teflon, PVC, Nylon 6,6 and Phenol-formaldehyde resin; Elastomers: Natural rubber, Merits and Demerits of Natural rubber. Vulcanization of rubber, Synthetic Rubber-Advantages, Inorganic rubbers- silicone polymers. Polymer composites- Synthesis and applications of Kevlar, conducting polymers-Criteria for conduction, synthesis of conducting polyaniline and applications, Biodegradable polymers-introduction, examples and applications.

Targeted Application & Tools that can be used:
Application areas: Water treatment sector, boilers, battery technology, nanotechnology, polymers, automotive and manufacturing industries.
Tools: Statistical analysis of Corrosion in materials using software tools like Design expert (ANOVA (Analysis of Variance) and RSM (Response Surface Methodology) etc.).

Project work/Assignment:

Assessment Type

- Midterm exam
- Assignments (Review of digital/ e-resource from PU link given in references section - mandatory to submit screen shot accessing digital resource.)
- Quiz/Seminar
- End Term Exam
- Self-Learning

Text Book

1. Wiley. *Engineering Chemistry*. Wiley Publishing.
2. Ozin, G.A., & Arsenault, A.C. (2009). *Nanochemistry: A Chemical Approach to Nanomaterials*. Royal Society of Chemistry.
3. Gadag, R.V., & Shetty, Nityananda. (2016). *A Textbook of Engineering Chemistry* (2nd ed.). I.K. International Publishing House.
4. Wiley. *Introduction to Petroleum Engineering*. Wiley Publishing.

Reference Books

1. Engineering Chemistry, Jain and Jain (18th Edition) Dhanpat Rai Publishing Company
2. Engineering Chemistry, Shika Agrawal (2018), Cambridge University Press
3. Hari Singh Nalwa, "Nanostructured Materials and Nanotechnology", Academic Press, 2008
4. Chemistry for Engineering Students, B.S. Jai Prakash, R. Venugopal, Sivakumaraiah & Dr. Pushpa Iyengar., Subash Publications, 5th Edition, 2014.
5. Callister, W. D., & Rethwisch, D. G., Materials Science and Engineering: An Introduction, 10th Edition, Wiley, 2018.

E-resources:

https://presiuniv.knimbus.com/user#/viewDetail?searchResultType=ECATALOGUE_BASED&unique_id=EBSCO95_30102024_108033
https://presiuniv.knimbus.com/user#/viewDetail?searchResultType=ECATALOGUE_BASED&unique_id=EBSCO95_30102024_50412
https://presiuniv.knimbus.com/user#/viewDetail?searchResultType=ECATALOGUE_BASED&unique_id=EBSCO95_30102024_222231
https://archive.nptel.ac.in/courses/103/107/103107212/
https://nptel.ac.in/courses/118104008
https://archive.nptel.ac.in/courses/113/105/113105102/
https://nptel.ac.in/courses/113108051
https://www.mdpi.com/books/pdfview/book/1069
https://www.bloomsburycollections.com/book/fuel-an-ecocritical-history/
https://www.youtube.com/watch?v=S-SOEBTplOM&t=1537s
https://interestingengineering.com/science
https://www.sciencedirect.com/book/9780123838469/standard-handbook-of-petroleum-and-natural-gas-engineering
https://www.bagchee.com/books/BB66394/petroleum-refining-technology

Skill Sets

All topics in theory component are relevant to Environment and Sustainability.

Catalogue prepared by	Faculty Members, Department of Chemistry

Course Code: **CHE2506**	**Course Title: Materials Chemistry Lab** **Type of Course: Laboratory only-Basic science course**	L-T-P-C	0	0	2	1
Version No.	1.0					
Course Pre-requisites	Before undertaking this Materials Chemistry Lab course, students are expected to possess foundational knowledge of chemistry, particularly in acids and bases, redox reactions, titration techniques, and the use of laboratory apparatus. Additionally, students should be familiar with handling chemicals and glassware safely and adhering to essential laboratory safety precautions.					
Anti-requisites	**NIL**					
Course Description	The laboratory course aims to develop experimental skills and apply fundamental chemical principles to address chemistry-related problems in engineering. The experiments are carefully designed to complement the theoretical concepts covered in lectures, providing hands-on experience to deepen scientific understanding and reinforce learning.					
Course Objective	The objective of the course is to familiarize the learners with the concepts of "Materials Chemistry Lab" and attain **SKILL DEVELOPMENT** through **EXPERIENTIAL LEARNING** techniques.					
Course Outcomes (COs)	On successful completion of the course, students shall be able to: **CO1:** Identify the basic techniques used in chemistry laboratories for both small- and large-scale water analysis and purification processes. **CO2:** Estimate the presence of ions or metal ions in domestic or industrial/domestic wastewater using laboratory methods. **CO3:** Recognize the laboratory techniques, such as titrations, separation/purification, and instrumentations, to perform chemical analysis. **CO4:** Compare the experimental results and demonstrate improved experimental skills through hands-on laboratory experience.					
Course Content:	**Total 30 sessions**					
Experiment 1	Experiment- 1	Experimental	Data Collection	Analysis and interpretation		
Estimation of Fe (II) in Mohr's salt using Standard Potassium permanganate (Water treatment, metallurgy).						
Experiment 2	Experiment-2	Experimental	Data Collection	Analysis and interpretation		
Estimation of total hardness of water by EDTA complexometric method (Water quality parameter).						
Experiment 3	Experiment-3	Experimental	Data Collection	Analysis and interpretation		
Determination of Chemical Oxygen Demand (COD) of Industrial Wastewater sample (Water Quality Assessment)						
Experiment 4	Experiment-4	Experimental	Data Collection	Analysis and interpretation		
Estimation of calcium oxide in cement solution by rapid EDTA method (Cement quality control)						
Experiment 5	Experiment-5	Experimental	Data Collection	Analysis and interpretation		
Estimation of Copper by iodometric method. (Metallurgy and mining)						
Experiment 6	Experiment-6	Experimental	Data	Analysis and		

			Collection	interpretation
Estimation of strength of an acid by Conductometric titration (Water Quality Assessment)				
Experiment 7	Experiment-7	Experimental	Data Collection	Analysis and interpretation
Potentiometric estimation of iron from industrial effluents (Electrochemical Analysis)				
Experiment 8	Experiment-8	Experimental	Data Collection	Analysis and interpretation
Determination of Viscosity co-efficient of a liquid mixture using Ostwald's viscometer (Fluid Dynamics)				
Experiment 9	Experiment-9	Experimental	Data Collection	Analysis and interpretation
Determination of pKa of weak acid using pH meter				
Experiment 10	Experiment-10	Experimental	Data Collection	Analysis
Determination of corrosion of mild steel in acidic medium by weight loss method (Understanding corrosion process)				
Experiment 11	Experiment-11	Experimental	Data Collection	Analysis
Determination of calorific value of a given solid fuel by Bomb Calorimeter (Fuel energy calculation)				
Experiment 12	Experiment-12	Experimental	Data Collection	Analysis
Synthesis of polyaniline (Understanding method of Materials synthesis)				

Any 8-9 experiments will be conducted out of 12

Assessment:

- Midterm exam
- Experimental Evaluation
- Report submission and Viva-voce
- End-term Exam

Text Book

1. Ramadevi, B., & Aparna, P., *Lab Manual for Engineering Chemistry*, S. Chand Publications, New Delhi, 2022.
2. Vogel, A. I., *Textbook of Practical Organic Chemistry*, 5th Edition.
3. Vogel, A. I., *Inorganic Quantitative Analysis*, ELBS Publications.
4. Ahluwalia, V. K., *College Practical Chemistry*, Narosa Publishing House, New Delhi.

References

Manoj Kumar Solanki, Engineering Chemistry Laboratory Manual – Educreation Publishing.

Sudha rani, S. K. Bashin, Engineering Chemistry Lab Manual – Krishna's Educational Publishers.

E-resources:

1. https://books-library.net/files/download-pdf-ebooks.org-kupd-679.pdf

Video Links:

1. https://www.youtube.com/watch?v=qDsGHYUHeBE
2. https://www.youtube.com/watch?v=1QkYvERH0sg
3. https://www.youtube.com/watch?v=ODFN6RZktn0
4. https://www.youtube.com/watch?v=L7KDozP1Tfo

5. https://www.youtube.com/watch?v=qKIA8EPnsyA 6. https://www.youtube.com/watch?v=y3Oa0L404oM
The topics related to Skill Development All the experiments are relevant to **Skill Development** through **Experiential Learning Techniques**. This is attained through assessment component mentioned in course handout.

Catalogue prepared by	Faculty Members, Department of Chemistry

Course Code: **EEE1200**	**Course Title: Basics of Electrical and Electronics Engineering.** **Type of Course: Engineering Science Course**		**L-T-P-C**	3	0	0	3
Version No.	2.0						
Course Pre-requisites	NIL						
Anti-requisites	NIL						
Course Description	This is a fundamental Course which is designed to know the use of basics of electrical and electronics engineering principles occurs in various fields of Engineering. The course emphasises on the characteristics and applications of electrical and electronic devices. The course also emphasizes on the working, analysis and design of electrical circuits using both active & passive components. Additionally, this course creates a foundation for the future courses such as Electrical machines, power system, power electronics Linear Integrated Circuits, Analog Communication and Digital Communication etc.						
Course Objective	The objective of the course is to familiarize the learners with the concepts of Basics of Electrical and Electronics Engineering and attain **Skill Development** through **Participative Learning** techniques.						
Course Outcomes	**On successful completion of this course the students shall be able to:** **CO1. Apply** basic law**s** of Electrical Engineering to compute voltage, currents and other parameters in the circuits. **CO2. Discuss** various fundamental parameters appearing in the characteristics of semiconductor devices and their applications. **CO3. Summarize** the operations of different biasing configurations of BJTs and amplifiers. **CO4. Discuss** the performance characteristics and applications of various electrical Machines.						
Course Content:							
Module 1	Introduction to Electrical Circuits	Assignment/ Quiz	merical solving Task	10 Sessions			
DC Circuits: Concept of Circuit and Network, Types of elements, Network Reduction Techniques- Series and parallel connections of resistive networks, Star–to-Delta Transformations, Mesh Analysis, Nodal Analysis, Numerical examples. **AC Circuits:** Fundamentals of single phase circuits - Series RL, RC and R-L-C Circuits, Concept of active power, reactive power and Power factor, Numerical examples. Introduction to three phase system and relation between line and phase values in Star & Delta connection, Numerical examples.							
Module 2	Semiconductor and Diode applications	Assignment/ Quiz	mory Recall based Quizzes	10 Sessions			
Mass Action Law, Charge densities in a semiconductor, Types of SC, Junction diodes - Ideal and practical behaviour, Modelling the Diode Forward Characteristic, and Diode applications like rectifiers, Zener diode, characteristics and its applications like voltage regulator.							
Module 3	Transistors and its Applications	Assignment/ Quiz	mory Recall-	10 Sessions			

			based Quizzes	
Transistor characteristics, Current components, BJT Configurations (CB, CC, CE configurations) and their current gains. Operating point, Biasing, Fixed Bias, and load line analysis. Single Stage amplifier. JFET (Construction, principal of Operation and Volt –Ampere characteristics). Pinch- off voltage, Comparison of BJT and FET. MOSFET (Construction, principal of Operation and symbol), MOSFET characteristics in Enhancement and Depletion modes.				
Module 4	Fundamentals of Electrical Machines	Assignment/ Quiz	merical solving Task	10 Sessions
Electrical Machines: Single phase transformers: principle of operation and EMF equation, Numerical examples. DC Motor: principle of operation, Back EMF, torque equation, Numerical examples. AC Motor: Principle operation of Induction Motors and its Applications.				
Self-Learning Topics: Clipping and clamping circuits, Stabilization Techniques, Voltage divider bias and its stability factor, Multistage amplifier, Darlington pair. **Special Machines:** Introduction to special electrical machines and its applications.				
Targeted Application & Tools that can be used: **Targeted Applications:** Application Area includes all electrical and electronic circuits (power supply unit, regulator unit, embedded devices, hardware electronics etc.). The students will be able to join a profession which involves basics to high level of electronic circuit design. Professionally Used Software: Multisim/ P Spice Besides these software tools hardware equipment such as Multimeters, Function Generators, Power Supplies, Oscilloscopes etc., can be used to perform component/circuit testing and analysis.				
Project Work/ Assignment:				
1. Article review: At the end, of course an article topic will be given to an individual or a group of students. They need to refer the library resources and write a report on their understanding about the assigned article in appropriate format. **2. Presentation:** There will be a group presentation, where the students will be given a topic. They will have to explain/demonstrate the working and discuss the applications for the same. **3. Case Study**: - At the end of the course students will be given a 'real-world' application based circuits like Power Amplifier, Signal/Function Generator etc. as a case study. Students will be submitting a report which will include Circuit Diagrams, Design, Working Mechanism and Results etc. in appropriate format				
Text Book(s): 1. Kothari D. P. & Nagrath I. J., "Basic Electrical and Electronics Engineering", Tata McGraw-Hill Education 2. Theraja B.L. and Theraja A.K., "A Textbook of Electrical Technology: Basic Electrical Engineering" in S.I. System of Units, 23rd ed., New Delhi: S. Chand, 2002. 3. A.P.Malvino, Electronic Principles,7thEdition, Tata McGraw Hill,2007 4. J. Millman, C. C. Halkias and C. D. Parikh, "Millman's Integrated Electronics", McGraw Hill Education, 2nd Edition. 5. Basics of Electrical & Electronics Laboratory Manual.				

Reference Book (s):

1. John Hiley, Keith Brown and Ian McKenzie Smith, "HUGHES Electrical and Electronic Technology", 10th Edition (Indian Edition published by Dorling Kindersley), Pearson,2011
2. Samarajit Ghosh, "Fundamentals of Electrical and Electronics Engineering", 2nd Edition, Prentice Hall India, 2007.
3. K Uma Rao, A Jaya Lakshmi, "Basic Electrical engineering" IK International publishing house Pvt. Ltd
4. R. L. Boylestad and L. Nashelsky, "Electronic Devices and Circuit Theory", Pearson Education India 7th Edition.
5. A K. Maini, V. Agrawal, "Electronic Devices & Circuits", Wiley, 2nd Edition
6. A.S Sedra, K. C. Smith, "Microelectronic Circuits", Oxford University Press, 6th Edition

Online Resources (e-books, notes, ppts, video lectures etc.):

1. https://presidencyuniversity.linways.com
2. https://www.digimat.in/nptel/courses/video/108105112/L01 "Fundamentals of Electrical Engineering-Basic Concepts, Examples"
3. Seminar Topic: https://nptel.ac.in/courses/108/105/108105153/ "Electrical Measurements"
4. Video lectures on "Electronic Devices" by Prof. Dr. A. N. Chandorkar, IIT Bombay http://www.satishkashyap.com/2013/03/video-lectures-on-electron-devices-by.html
5. Video lectures on "Analog Electronics" by Prof. S.C. Dutta Roy, IIT Delhi https://nptel.ac.in/courses/108/102/108102095/
6. Video lectures on "Diodes", by Prof. Chitralekha Mahanta, IIT Guwahati, https://nptel.ac.in/courses/117/103/117103063/

E-content:

1. "Introduction to Electrical Machines https://nptel.ac.in/courses/108/102/108102146/"

M. -Y. Kao, H. Kam and C. Hu, "Deep-Learning-Assisted Physics-Driven MOSFET Current Voltage Modeling," in IEEE Electron Device Letters, vol. 43, no. 6, pp. 974-977, June 2022, doi: 10.1109/LED.2022.3168243 https://ieeexplore-ieee-org-resiuniv.knimbus.com/document/9758727

2. F. Bonet, O. Aviñó-Salvadó, M. Vellvehi, X. Jordà, P. Godignon and X. Perpiñà, "Carrier

Concentration Analysis in 1.2 kV SiC Schottky Diodes Under Current Crowding," in IEEE Electron Device Letters, vol. 43, no. 6, pp. 938-941, June 2022, doi: 10.1109/LED.2022.3171112. https://ieeexplore-ieeeorg-presiuniv.knimbus.com/document/9764749

3. M. Chanda, S. Jain, S. De and C. K. Sarkar, "Implementation of Subthreshold Adiabatic Logic for Ultralow-Power Application," in IEEE Transactions on Very Large Scale Integration (VLSI) Systems, vol. .23, no. 12, pp. 2782-2790, Dec. 2015. https://ieeexplore.ieee.org/document/7018053

4. R. Raut and O. Ghasemi, "A power efficient wide band trans-impedance amplifier in submicron CMOS integrated circuit technology," 2008 Joint 6th International IEEE Northeast Workshop on Circuits and Systems and TAISA Conference, 2008, pp. 113-116, doi: 0.1109/NEWCAS.2008.4606334. https://ieeexplore.ieee.org/document/4606334

Topics relevant to "SKILL DEVELOPMENT": Performing suitable experiments to compute the electric circuit parameters, performance operation of machines, and operation of semiconductor devices for **Skill Development** through **Participative Learning techniques.** This is attained through assessment component mentioned in course plan.

Catalogue prepared by	Dr. Ajay Kumar Maurya

<table>
<tr><td>Course Code: EEE1251</td><td>urse Title: Basics of Electrical and Electronics Engineering Laboratory
Type of Course: ESC - Laboratory</td><td>L-T-P-C</td><td>0</td><td>0</td><td>2</td><td>1</td></tr>
<tr><td>Version No.</td><td colspan="6">1.0</td></tr>
<tr><td>Course Pre-requisites</td><td colspan="6">Nil</td></tr>
<tr><td>Anti-requisites</td><td colspan="6">Nil</td></tr>
<tr><td>Course Description</td><td colspan="6">This fundamental laboratory provides an opportunity to validate the concepts taught in the basics of electrical and electronics engineering and enhances the ability to visualize real system performance, using both hardware and simulation tools.</td></tr>
<tr><td>Course Objective</td><td colspan="6">The objective of the course is to familiarize the learners with the concepts of Basics of Electrical and Electronics Engineering and attain Skill Development through Experiential Learning techniques.</td></tr>
<tr><td>Basic skill sets required for the laboratory</td><td colspan="6">The students shall be able to develop:
1) An attitude of enquiry.
2) Confidence and ability to tackle new problems.
3) Ability to interpret events and results.
4) Ability to work as a leader and as a member of team.
5) Assess errors and eliminate them.
6) Observe and measure physical phenomenon.
7) Write Reports.
8) Select suitable equipment, instruments and materials.
9) Locate faults in systems.
10) Skills for setting and handling equipment.
11) The ability to follow standard test procedures.
12) An awareness of the need to observe safety precautions.
13) To judge magnitudes without actual measurement.</td></tr>
<tr><td>Course Outcomes</td><td colspan="6">On successful completion of the course, the students shall be able to:
1. Demonstrate the behavior of passive elements and fundamental electrical circuit laws
2. Determine the power factor, impedance, and phase relationship of R and RL loads under AC supply conditions.
3. Develop electrical circuits and three-phase supply systems using MATLAB/Simulink to study resistance, voltage, and current characteristics.
4. Analyze the performance characteristics of electrical machines, including single-phase transformers and three-phase induction motors, under different operating conditions.
5. Examine the output characteristics and performance parameters of half-wave and full-wave rectifiers.
6. Illustrate the performance characteristics of Zener diode and MOSFET under different operating conditions.</td></tr>
<tr><td>Course Content:</td><td colspan="6">List of Laboratory Tasks:
<u>Experiment No 1:</u> Familiarization of passive elements.
Level 1: Identify and understand the function and ratings of basic passive elements.
Level 2: Study the behavior of passive elements in simple electrical circuits by measuring voltage, current, and impedance.
<u>Experiment No 2:</u> Experimental Verification of Kirchhoff’s Voltage Law (KVL) and Kirchhoff’s Current Law (KCL).
Level 1: Study and Verify KVL and KCL for the given electrical Circuit.
<u>Experiment No 3:</u> Determination of Power Factor, and Impedance for R and RL Loads.</td></tr>
</table>

	Level 1: Determine the power factor and impedance of R and RL loads under steady-state AC supply conditions. Level 2: Analyze the effect of inductance on power factor, impedance, and phase angle for RL loads under varying load conditions. **Experiment No 4:** Modeling and Simulation of effective resistances in different circuit connections Using Simulink. Level 1: Model and simulate series and parallel resistor circuits in Simulink and determine their effective resistance. Level 2: Analyze the effect of different resistor combinations on total resistance, current distribution, and voltage drop. **Experiment No 5:** Simulation and analysis of line and phase voltages in Star-connected and Delta- connected supply systems. Level 1: Model and simulate star-connected and delta-connected three-phase supply systems and observe line and phase voltages. Level 2: Analyze and compare the relationship between line and phase voltages in star and delta connections. **Experiment 6:** Determination of transformation ratio of a Single-Phase Transformer Under different tapping conditions. Level 1: Determine the transformation ratio of a single-phase transformer under no-load condition for various tap settings. Level 2: Analyze the effect of different tapping conditions on secondary voltage, regulation, and transformer performance. **Experiment No. 7:** Study of the speed-torque characteristics of a Three-Phase Induction Motor. Level 1: Study and analyze the speed–torque characteristics of a three-phase induction motor. Level 2: Evaluate the effect of supply voltage and current on motor performance parameters such as slip, and torque. **Experiment 8:** Performance Analysis of Half-Wave and Full-Wave Rectifier Circuits Using Simulink. Level 1: Model and simulate half-wave and full-wave rectifier circuits in Simulink and analyze their output waveforms. Level 2: Evaluate and compare rectifier performance parameters such as ripple factor, efficiency, and output voltage. **Experiment 9:** Study of the characteristics of a Zener Diode. Level 1: Study the forward and reverse V–I characteristics of a Zener diode using DC analysis. Level 2: Analyze the Zener breakdown characteristics and determine the Zener voltage and regulation behavior. **Experiment 10:** Study of the Output and Transfer Characteristics of a MOSFET. Level 1: Study, analyze and implement the output characteristics of a MOSFET under different gate-source voltage conditions and observe their results. Level 2: Analyze the transfer characteristics of a MOSFET and evaluate key parameters such as threshold voltage and transconductance.

Targeted Application & Tools that can be used:

Targeted Applications: Application area includes all electrical and electronic circuits (power supply unit, regulator unit, embedded devices, hardware electronics etc.). The students will be able to join a profession which involves basics to high level of electronic circuit design.

Professionally Used Software: MATLAB SIMULINK

Besides these software tools hardware equipment such as Multimeters, Function Generators, Power Supplies, Oscilloscopes etc., can be used to perform component/circuit testing and analysis.

urse Material

1. Basics of Electrical and Electronics Engineering Laboratory Manual, Presidency University, Bengaluru.

Text Book:

1. D. P. Kothari and I. J. Nagrath, Basic Electrical Engineering, 4th Edition, McGraw Hill Education, New Delhi, 2019.
2. B. L. Theraja and A. K. Theraja, A Textbook of Electrical Technology, Volume-I: Basic Electrical Engineering in SI Units, 24th Edition, S. Chand Publishing, New Delhi, 2024.

References

1. John Hiley, Keith Brown and Ian McKenzie-Smith, Hughes Electrical and Electronic Technology, 12th Edition, Pearson Education, 2016.
2. S. K. Bhattacharya and D. Devaraj, Basic Electrical and Electronics Engineering, 2nd Edition, Pearson Education India, 2017.
3. T. K. Nagsarkar and M. S. Sukhija, Principles of Basic Electrical Engineering, 1st Edition, Oxford University Press, 2018.
4. Robert L. Boylestad and Louis Nashelsky, Electronic Devices and Circuit Theory, 12th Edition, Pearson Education, 2019.
5. A. K. Maini and Varsha Agrawal, Electronic Devices and Circuits, 2nd Edition, Wiley India, 2019.
6. Adel S. Sedra and Kenneth C. Smith, Microelectronic Circuits, 8th Edition, Oxford University Press, 2019.

Online Resources:

1. https://presidencyuniversity.linways.com
2. https://www.digimat.in/nptel/courses/video/108105112/L01 "Fundamentals of Electrical Engineering - Basic Concepts, Examples"
3. Video lectures on "Electronic Devices" by Prof. Dr. A. N. Chandorkar, IIT Bombay http://www.satishkashyap.com/2013/03/video-lectures-on-electron-devices-by.html
4. NPTEL lectures on "Rectifiers", by Prof. G. Bhuvaneswari, IIT Delhi https://nptel.ac.in/courses/108102145
5. NPTEL Lectures on "Electrical Machines II", by Prof. G. Sridhara Rao, IIT Madras. https://nptel.ac.in/courses/108106072

Topics relevant to "EMPLOYABILITY SKILLS": All the experiments which are listed are for **Skill Development** through **Experiential Learning Techniques**. This is attained through the assessment component mentioned in course handout.

Topics relevant to "HUMAN VALUES & PROFESSIONAL ETHICS": Standard test methods, safety procedure.

Catalogue prepared by	
Recommended by the Board of Studies on	
Date of Approval by the Academic Council	

Course Code:ENG1900	Course Tittle: English for Technical Communication Type of Course: HSMC	L- T- P- C	2	0	0	2
Version No.	1.0					
Course Pre-requisites	+2 Level					
Anti-requisites	NIL					
Course Description	This course enhances the technical communication skills of BTech students, focusing on clarity, precision, and conciseness in academic and professional settings. Students will learn to differentiate between general and technical communication, analyze technical content, develop structured writing skills, and deliver effective presentations. Through interactive activities such as TED Talk analyses, report writing, and presentation practice, the course provides hands-on experience for real-world applications. By the end, students will be equipped to communicate complex technical information effectively in various professional contexts.					
Course Outcomes	On successful completion of the course the students shall be able to: CO1. Differentiate between general and technical communication. CO2. Explain key reading comprehension techniques to enhance understanding of technical texts. CO3. Write clear, concise, and well-structured technical reports and documents. CO4. Deliver technical presentations and implement peer feedback for continuous improvement. CO5. Explain ethical practices in digital communication for professional use.					

Course Content: Theory

Module 1	Technical communication	Quiz	Listening	9 Sessions

Introduction to Communication

Technical vs. General Communication

Characteristics of technical communication

Importance of clarity, precision, and objectivity

Activity:

- Watching TED Talks/videos to identify differences in technical and general vocabulary

Module 2	Technical Reading	Assignment	Reading	12 Sessions

Reading Comprehension

Note making & Notetaking

Content Analysis

Activity:

- Reading technical articles and answering comprehension questions
- Note making techniques

Module 3	**Technical Writing**	**Assignment**	**Writing**	**12 Sessions**

Paragraph Writing

Structure of a paragraph (topic sentence, supporting details, coherence)

Report Writing

Structure of technical and project reports (Introduction, Methods, Results, Discussion)

Activity:

- Writing a structured paragraph on a technical topic
- Writing project reports

Module 4	**Professional Presentation**	**Presentation**	**Speaking**	**12 Sessions**

Introduction to Presentation Skills

Preparing a Presentation

- Structuring content (Introduction, Body, Conclusion)
- Designing effective slides (Text. visual aids, readability, and impact)

Delivering a Presentation

- Engagement techniques, Storytelling, narration, pitching ideas handling Q&A
- Conviction, commitment, generating interest through enthusiasm

Demonstration & Practice

- Giving presentations on topics based on their academic interest
- Evaluating and providing peer feedback

Activity:

- Analyze a real-world engineering issue and present solutions using a structured approach.

Targeted Application & Tools that can be used: YouTube, Instagram, Quill Bot, Grammarly, & Padlet.

References:

Text books:

1. Gupta, R.C. *Technical Communication.* 2nd ed., Cambridge University Press, 2021.
2. Lannon, John M., and Laura J. Gurak. *Technical Communication.* 15th ed., Pearson, 2022.

Reference Books:

1. Gerson, Sharon J., and Steven M. Gerson. Technical Communication: Process and Product. 9th ed., Pearson, 2020.
2. Lannon, John M., and Laura J. Gurak. Technical Communication. 15th ed.,

<table>
<tr><td colspan="2">Pearson, 2022.
3. Markel, Mike, and Stuart A. Selber. Technical Communication. 13th ed., Bedford/St. Martin’s, 2020.
Web Resources:
1. https://owl.purdue.edu/owl/subject_specific_writing/technical_writing.
2. https://journals.ieeeauthorcenter.ieee.org/.
3. https://www.stc.org/.
4. https://ocw.mit.edu/.https://www.ted.com/talks.</td></tr>
<tr><td colspan="2">Topics Relevant to “employability”: Teamwork and Collaboration, Critical Thinking and Problem- Solving
Topics Relevant to “Human Values and Professional Ethics”: Critical reasoning, Inclusivity and Fairness</td></tr>
<tr><td>Catalogue prepared by</td><td>Dr. Vinodhini Chinnaswamy & Dr. T. Naresh Naidu</td></tr>
</table>

<table>
<tr><td>Course Code:

PPS1025</td><td colspan="3">Course Title: Industry Readiness Program – I
Type of Course: Practical Only Course</td><td>L- T - P- C</td><td>0</td><td>0</td><td>2</td><td>0</td></tr>
<tr><td>Version No.</td><td colspan="8">1.0</td></tr>
<tr><td>Course Pre-requisites</td><td colspan="8">• Students are expected to understand Basic English.
• Students should have desire and enthusiasm to involve, participate and learn.</td></tr>
<tr><td>Anti-requisites</td><td colspan="8">NIL</td></tr>
<tr><td>Course Description</td><td colspan="8">This course is designed to enable students to set SMART goals, form professional & personal ethics for success and learn various email writing techniques. The course will benefit learners in presenting themselves effectively through various activities and learning methodologies.</td></tr>
<tr><td>Course Objective</td><td colspan="8">The objective of the course is to familiarize the learners with the concepts of “Employability for Young Professionals” and attain SKILL DEVELOPMENT through PARTICIPATIVE LEARNING techniques</td></tr>
<tr><td>Course Out Comes</td><td colspan="8">On successful completion of this course the students shall be able to:
CO 1 Define their career goals
CO 2 Practice ethical habits for better career success
CO3 Demonstrate effective email writing techniques</td></tr>
<tr><td>Course Content</td><td colspan="8"></td></tr>
<tr><td>Module 1</td><td>Goal Setting & Grooming</td><td colspan="3">Classroom activities</td><td colspan="3">10 Sessions</td></tr>
<tr><td colspan="9">Topics: SMART Goals, formal grooming through self-introduction activity

Activity: Real world scenarios</td></tr>
<tr><td>Module 2</td><td>Habit Formation</td><td colspan="3">Role plays</td><td colspan="3">10 Sessions</td></tr>
<tr><td colspan="9">Topics: Professional and Personal ethics for success and activity-based practice

Activity: Students to present 2 min video on building professional ethics</td></tr>
</table>

Module 3	Email Etiquettes	Individual and group presentation		10 Sessions
Topics: Types of prompts to generate effective or desired results for email etiquettes **Activity:** Individual student presenting various search prompts				
Targeted Application & Tools that can be used: 1. TED Talks 2. You Tube Links 3. Activities				
Assignment proposed for this course Assignment 1: SMART Goal Assignment 2: AI tools for prompt search				
Continuous Individual Assessment Module 1: Presentation Module 2: Activity based assessment Module 3: Class assessment				
The topics related to skill development: Students acquire knowledge on SMART goals, implement grooming standards, practice ethical behavior in class and campus, acquire hands-on experience to use AI tools to get search prompts for desired email etiquettes.				
Catalogue prepared by	Faculty of L&D			

Course Code: **LAW7601**	**Indian Constitution** **Type of Course: MOOC course**	**L- T- P- C**	**-**	**-**	**-**	**0**
		Contact hours	**-**	**-**	**-**	**-**
Course Pre-requisites	NIL					
Anti-requisites	**NIL**					
Course Description	This course is designed to improve the learners' SKILL DEVELOPMENT by using PATICIPATIVE LEARNING techniques. It is designed to equip students with the knowledge about the Constitution of India. This course aims to introduce the constitutional law of India to students from all walks of life and help them understand the constitutional principles as applied and understood in everyday life. The objective of making the Constitution of India, familiar to all students, and not only to law students, this course aims and objectifies legal understanding in the simplest of forms. **This course is designed to cater to Constitutional Studies.**					
Course Objective	The objective of the course is **'SKILL DEVELOPMENT'** of the student by using **'PARTICIPATIVE LEARNING'** techniques					
Course Outcomes	On successful completion of this course the students shall be able to: CO1. Describe the basic understanding of the Indian Constitution and the concepts and issues relevant to day-to-day life of the nation and to equip the Citizen with the zeal of capacity building. Recognizing and identify the values of the Constitution of India. CO2. Enabling the Citizen-centric Awareness of Rights and Responsibilities of the State CO3. Explain the role of the State actors in building India. CO4. Understanding the Gandhian vision over the power of the LSG (Local Self-Governance)					
Course Content:						
Module 1	Understanding the Making of the Constitution: The Constituent Assembly & The Constitution of India					
Topics: Historical Context of Constituent Assembly - Compositions & Functions of Constituent Assembly What is a Constitution? – Why have a Constitution? – Constitutional Change - Features of Indian Constitution – Preamble of Indian Constitution						
Module 2	Citizen's Fundamental Rights and State's Responsibilities (Directive Principles)					
Topics: Introduction to Fundamental Rights - Right to Equality – Facets of Right to Equality - Right to Freedom - Constitutional Position of Some Democratic Rights - Right Against Exploitation - Right to Freedom of Religion - Right to Constitutional Remedies Directive Principles of the State Policy						
Module 3	Organs Of the Government					
Topics: **Executive**: The President of India - Powers and Functions of President of India -						

Emergency Powers and the Position of the President
Legislature: Union Council of Ministers - Prime Minister - The Rajya Sabha - The Lok Sabha - Relation between the Lok Sabha & Rajya Sabha - Office of the Speaker – Important Parliamentary Committees
Judiciary: The Structure and Organization of the Judiciary & the High Court - The Supreme Court - Role of The Supreme Court - Judicial Activism in India - Basic Structure Doctrine & PIL

Module 4	Federalism & Decentralization		

Topics:
What is Federalism? - Centre-State Legislative Relations - Centre-State Administrative Relations - Centre-State Financial Relations
The 5th & 6th Schedules - Municipality- (History of Indian Municipality, Organization & Functions) – Panchayat 1 (Idea of Panchayat, Organization and Powers of Panchayats in India)

Targeted Application & Tools that can be used:
Application areas to familiarize students with fundamentals of Indian Constitutional concepts.
Tools: Online Tools – NPTEL and Swayam.

Project work/Assignment:

Assessment Type

- Online end term exam will be conducted as notified by the Presidency University.

Online Link*:

1) Prof. Amitabha Ray, SWAYAM Course: "Constitutional Government & Democracy in India"
https://onlinecourses.swayam2.ac.in/cec19_hs13/preview

* Other source links are available in below Resources link.

Text Book

1. Durga Das Basu --- Introduction to the Constitution of India, 23rd Edition (Gurgaon; LexisNexis, 2018).
2. MP Jain's Constitutional Law of India, Lexis Nexis
3. V.N Shukla's Indian Constitutional Law, M.P Singh 13th Edition
4. MV Pylee's Constitution of India
5. J.C.Johari -- The Constitution of India: A Politico-Legal Study (Greater Noida: Sterling Publishers Pvt. Ltd. 2013).
6. Himangshu Roy and M.P.Singh – Indian Political System, 4th Edition (Bengaluru; Pearson Education, 2018)
7. Vidya Bhushan & Vishnoo Bhagwan--- Indian Administration (S. Chand, 2011)
8. S.R.Maheswari --- Indian Administration (Orient Blackswan, 2001)
9. Dr. A.Avasthi & A.P. Avasthi --- Indian Administration (L.N. Agarwal Educational Publishing, 2017).
10. B. L. Fadia --- Indian Government and Politics (Sahitya a. Bhawan, 13th Revised Edition, 2017).
11. P.M.Bakshi – The Constitution of India (Prayagraj, UP; a. Universal Law Publishing, January, 2018)

Reference Books

1. HM Seervai, Constitutional Law of India, 4th Ed. Vol I, II, & III
2. Uday Raj Rai, Constitutional Law-I
3. Democracy and Constitutionalism in India, Oxford University Press 2009

Resources:

1. https://onlinecourses.nptel.ac.in/noc20_lw03/course?&force_user=true
2. https://onlinecourses.swayam2.ac.in/cec19_hs13/course?&force_user=true

3. https://nptel.ac.in/courses/129106003 4. https://nptel.ac.in/courses/129106411 5. https://nptel.ac.in/courses/129105608 6. https://nptel.ac.in/courses/129106002
Topics relevant to Skill Development: 1. An attitude of inquiry. 2. Write reports **The topics related to Constitutional Studies and its application :** All topics in theory component are relevant to Indian Constitution.

Catalog prepared by	Faculty members of the Department of Law.

Course Code: **MEC2005**	**Course Title: Fundamentals of Aerospace Engineering** **Type of Course: Program Core Course**	**L-T-P-C**	3	0	0	3
Version No.	1.1					
Course Pre-requisites	NIL					
Anti-requisites	NIL					
Course Description	The purpose of this course is to give an overview of the fundamentals of aerospace engineering. It will give an overview of the aircraft industry, discuss the different components of and different types of aircrafts, go into the mechanical, electrical, electronic and auxiliary systems in aircrafts, discuss aircraft engines, pressurization, cover the basic principles of flight and space flight, and discuss various aircraft maneuvers.					
Course Objective	The objective of the course is to familiarize the learners with the concepts of " **Fundamentals of Aerospace Engineering**" and attain **ENTREPRENEURIAL SKILL** through Problem solving methodologies.					
Course Outcomes	**On successful completion of the course the students shall be able to:** CO 1: Solve problems based on the concepts of flowing gases and the standard atmosphere CO 2: Apply the principles of basic aerodynamics to airfoils CO 3: Determine the thrust and power requirements for level, unaccelerated flight of an aircraft CO 4: Explain the criteria for longitudinal static stability for an airplane CO 5: Apply the basics of space vehicle trajectories to simple missions CO 6: Determine some propulsive characteristics of aircraft and rocket engines					
Course Content:						
Module 1	Introduction	Assignment	Data Analysis task		10 Sessions	
Topics: Introduction, early developments, Sir George Cayley, Otto Lilienthal, Wilbur and Orville Wright. fundamental physical quantities of flowing gas, the source of all aerodynamic forces, equation of state for a perfect gas, anatomy of the airplane and a space vehicle, definition of altitude, the hydrostatic equation, geopotential and geometric altitudes, definition of the standard atmosphere, pressure, temperature and density altitudes.						
Module 2	Basic Aerodynamics	Assignment	Programming task and simulation		15 Sessions	
Topics: The continuity equation, incompressible and compressible flow, momentum equation, elementary thermodynamics, isentropic flow, energy equation, speed of sound, low-speed subsonic wind tunnels, introduction to airfoils, airfoil nomenclature, lift, drag and moment coefficients, airfoil data, infinite versus finite wings, pressure coefficient, obtaining lift coefficient from the pressure coefficient**.**						

Module 3	Airplane Performance, Stability and Control	Assignment	Data Collection and Analysis	10 Sessions
Topics: The drag polar, equations of motion, thrust and power requirements for level, unaccelerated flight, thrust available and maximum velocity, power available and maximum velocity, definitions of stability and control, moments on the airplane, absolute angle of attack, criteria for longitudinal static stability.				
Module 4	Propulsion	Assignment	Data Collection and Analysis	10 Sessions
Topics: Introduction, propeller, reciprocating engine, jet propulsion, turbojet engine, turbofan engine, ramjet engine, rocket engine, rocket propellants, rocket equation, rocket staging and propellant requirements for spacecraft trajectory maneuvers.				
Targeted Application & Tools that can be used: Application Area is Indian Space Research Organization (ISRO), Hindustan Aeronautics Limited (HAL), DRDO, General Electric(GE), Bombardier and many others Professionally Used Software: XFLR, Aeolus.				
Textbooks T1 A. C. Kermode, Flight Without Formulae, Pearson Education, 10th Edition T2 A. C. Kermode, Mechanics of Flight, Pearson Education, 5th Edition				
References R1 Shevell, Fundamentals of Flight, Pearson Education, 2nd Edition R2 Dave Anderson, Introduction to Flight R3 I. Moir, A. Seabridge, Aircraft Systems: Mechanical, Electrical and Avionics Subsystems Integration, Wiley				
Web Resources: 1. Knimbus - Your Library. Anywhere, Anytime.				
Topics relevant to "ENTREPRENEURIAL SKILLS": Aerodynamic forces Equation, propellers equation for developing ENTREPRENEURIAL SKILLS through Problem-Solving methodologies. This is attained through the assessment component mentioned in the course handout.				
Catalogue prepared by	Mr. Yeshwanth D			

Course Code: MAT1214	**Course Title: Calculus, Differential Equations and Vector Analysis** **Type of Course:1] School Core**	**L-T- P-C**	**3**	**1**	**0**	**4**
Version No.	1.0					
Course Pre-requisites	NIL					
Anti-requisites	NIL					
Course Description	This course introduces advanced topics in calculus, differential equations, and vector analysis, emphasizing analytical techniques for solving mathematical problems involving curves, functions of several variables, ordinary differential equations, multiple integrals, and vector fields. The course covers polar curves and curvature, partial differentiation and optimization of multivariable functions, higher-order differential equations, applications of definite and multiple integrals, and the fundamental concepts and theorems of vector calculus. These topics provide a strong mathematical foundation for modeling, analyzing, and solving problems arising in science and technology.					
Course Objective	Upon successful completion of this course, students will be able to apply the concepts of polar curves, curvature, and multivariable differential calculus to analyze the geometric and analytical properties of functions and curves. They will be capable of solving higher-order ordinary differential equations using appropriate analytical methods and applying these techniques to practical problems. Students will also evaluate definite, improper, double, and triple integrals to determine areas, volumes, centers of mass, and other related quantities. Furthermore, they will apply the principles of vector fields, line, surface, and volume integrals, along with the fundamental theorems of vector calculus, to solve a variety of mathematical problems. Overall, the course will enhance their analytical thinking and problem-solving abilities by enabling them to effectively apply advanced calculus concepts to diverse mathematical situations.					
Course Outcomes	On successful completion of the course the students shall be able to: **CO1:** Apply the properties of polar curves to solve problems related to tangents, intersections, and curvature (L3) **CO2:** Apply the mathematical properties of Beta and Gamma functions to solve definite and improper integrals (L3) **CO3:** Employ multivariable differential calculus to solve problems in multidimensional physical systems (L3) **CO4:** Solve the second and higher-order linear differential equations by using appropriate methods (L3) **CO5:** Apply the concept of double and triple integrals to calculate area, volume (L3) **CO6:** Employ vector integral theorems to simplify multi-dimensional field equations into solvable boundary integrals for engineering analysis (L3)					

Course Content:		
Module 1	**Polar Curves and Curvatures**	**(14L+5T=19 Sessions)**
Polar Coordinates, polar curves, angle between radius vector and the tangent, angle between two curves, pedal equations, curvature and radius of curvature. Curvature of Highway Curves for civil, Cam Profile problem for mechanical, Well Trajectory problem for petroleum Temperature Distribution in Concrete (civil), Heat Transfer analysis (mechanical), Reservoir Pressure (petroleum)		
Module 2	**Integral Calculus**	**(10L+3T=13 Sessions)**
Evaluation of definite and improper integrals; Beta and Gamma functions and their properties; definite integrals to evaluate surface areas and volumes of revolutions. Double integrals (Cartesian), Change of order of integration in double integrals, Triple integrals, Change of variables (Cartesian to polar, cylindrical and spherical coordinates), area, volume -Center of mass and Gravity (constant and variable densities), orthogonal curvilinear coordinates, Problems involving cubes, sphere and rectangular parallelepiped. Water Flow Through a Channel (Civil), Improper Integral in Heat Transfer (Mechanical), Reservoir Probability Models (petroleum).		
Module 3	**ODE Higher Order**	**(9L+3T=12 Sessions)**
Linear differential equations of second and higher order with constant coefficients-non- homogenous term of the type Q(x)=e^ax, Sianax, Cosax, e^ax V(x)-Method of variation of parameters. Problem on Bridge Vibration (Civil), Spring-Mass System (Mechanical), Pressure Variation (petroleum).		
Module 4	**Vector Calculus**	**(12L+4T=16 Sessions)**
Vector & Scalar Functions and Fields, Derivatives, Curve, Arc length, Curvature & Torsion, Gradient of Scalar Field, Directional Derivative, Divergence of a Vector Field, Curl of a Vector Field, Physical interpretation, Solenoidal and Irrotational Vector Fields. Line Integrals, Path Independence of Line Integrals, Surface and Volume Integrals: Green's Theorem in the plane, Divergence Theorem of Gauss, Stokes's Theorem. Problems on Temperature Distribution, Road Construction, Groundwater Flow (Civil), Shaft Design, Heat Flow, Work Done (Mechanical), Pipeline energy calculations, Reservoir boundary analysis (petroleum)		
Targeted Applications & Tools that can be used: • Highway curve design, road alignment, cam profile design, well trajectory planning, temperature distribution analysis, heat transfer modeling, and reservoir pressure estimation using polar curves, curvature, and differential calculus concepts. • Evaluation of areas, volumes, centers of mass, and gravity for engineering structures using definite, improper, double, and triple integrals; applications in water flow analysis, heat transfer problems, and reservoir probability modeling.		

- Analysis of bridge vibrations, spring-mass systems, pressure variation in reservoirs, and other dynamic engineering systems using higher-order ordinary differential equations and variation of parameters.
- Modeling and analysis of vector fields, temperature distribution, groundwater flow, road construction, shaft design, heat flow, work done, pipeline energy calculations, and reservoir boundary analysis using vector calculus, line, surface, and volume integrals.
- Applications in civil, mechanical, and petroleum engineering, scientific computing, computational mathematics, fluid mechanics, structural analysis, optimization, and numerical simulation.

Softwares: MATLAB, Mathematica, Maple, Python, GeoGebra, Octave, R, Scilab.

Text Book

1. E. Kreyszig, Advanced Engineering Mathematics, 10th ed. Hoboken, NJ, USA: John Wiley & Sons, 2011.
2. B. S. Grewal, Higher Engineering Mathematics, 44th ed. New Delhi, India: Khanna Publishers, 2018.

References:

1. E. Kreyszig, Advanced Engineering Mathematics, 10th ed. Hoboken, NJ, USA: John Wiley & Sons, 2011.
2. B. S. Grewal, Higher Engineering Mathematics, 44th ed. New Delhi, India: Khanna Publishers, 2018.
3. R. K. Jain and S. R. K. Iyengar, Advanced Engineering Mathematics, 5th ed. New Delhi, India: Narosa Publishing House, 2016.
4. G. B. Thomas, M. D. Weir, and J. Hass, Thomas' Calculus, 14th ed. Boston, MA, USA: Pearson, 2018.
5. H. Anton, I. Bivens, and S. Davis, Calculus: Early Transcendentals, 11th ed. Hoboken, NJ, USA: John Wiley & Sons, 2016.
6. D. G. Zill and W. S. Wright, Advanced Engineering Mathematics, 6th ed. Burlington, MA, USA: Jones & Bartlett Learning, 2018.

E-resources/ Web links:

1. https://research.ebsco.com/c/n5guci/search/details/rqkwq6imwb?request-context=plink&db=nlebk
2. https://open.umn.edu/opentextbooks/textbooks/24
3. https://research.ebsco.com/c/n5guci/search/details/6wtbgoqnff?request-context=plink&db=nlebk

Topics relevant to SKILL DEVELOPMENT: The course develops analytical thinking, mathematical modeling, computational proficiency, optimization techniques, engineering simulation skills, and problem-solving abilities required for Civil, Mechanical, and Petroleum Engineering applications using modern software tools such as MATLAB, ANSYS, COMSOL, Civil 3D, SolidWorks, and Petrel.

Catalogue prepared by	**Dr. K Govindarajulu**

Recommended by the Board of Studies on	
Date of Approval by the Academic Council	

<table>
<tr><td>Course Code:
PHY2503</td><td colspan="2">Course Title
Fundamentals of Materials Physics
Type of Course: Basic Science</td><td>L-T-P-C</td><td>3</td><td>0</td><td>0</td><td>3</td></tr>
<tr><td>Version No.</td><td colspan="7">1.0</td></tr>
<tr><td>Course Pre-requisites</td><td colspan="7">Nil</td></tr>
<tr><td>Anti-requisites</td><td colspan="7">NIL</td></tr>
<tr><td>Course Description</td><td colspan="7">The course is intended to provide an overview of physics principles which determine the properties and behavior of materials. This knowledge will help students in identifying the most suitable material for a desired function and in estimating their behavior under different environmental conditions. This theory course integrated with lab providing practical application of the concepts taught while developing an attitude of enquiry and confidence to tackle new problems. The course also develops team working and report writing skills through project work and assignments.</td></tr>
<tr><td>Course OutComes</td><td colspan="7">On successful completion of the course the students shall be able to:
CO1] Identify the crystal structure of materials from X-ray diffraction patterns.

CO2] Describe the electrical and thermal properties of Materials.

CO3] Discuss the mechanical properties of materials.

CO4] To understand the physics of nanomaterial and material characterization techniques.</td></tr>
<tr><td>Course Objective</td><td colspan="7">This course aims to provide a foundational understanding of the structure, properties, and behavior of materials. It introduces key concepts in physical metallurgy, functional and bulk properties of materials, and nano-materials, along with their synthesis and characterization techniques. .</td></tr>
<tr><td>Course Content:</td><td colspan="7"></td></tr>
<tr><td>Module 1</td><td>Introduction To Physical Metallurgy</td><td>Assignment</td><td colspan="3">Prepare models of crystal structures</td><td>12 Sessions</td></tr>
<tr><td colspan="8">Topics: Space lattice and unit cells, Bravais Lattices, Miller Indices, calculation of packing fractions, coordination number, defects in solids , The Phase Rule , Binary Phase Diagrams , cooling curves, Microstructural Changes during Cooling .The Iron Carbon Equilibrium Diagram.</td></tr>
<tr><td>Module 2</td><td>Functional Properties Of Materials</td><td>Assignment</td><td colspan="3">Data collection</td><td>10 Sessions</td></tr>
<tr><td colspan="8">Electrical Properties of Materials: Classification of materials based on band gap, Fermi energy, Fermi temperature. Semiconductors and its applications, Hall effect, Dielectric Materials: Introduction, polarization, expression for polarization, types of polarization, expression for electronic polarizability.
Thermal Properties: Thermal conductivity, Seebeck effect, Peltier effect, and Thomson effect. Theory and determination of thermal conductivity using Forbe’s and Lee–Charlton’s methods</td></tr>
<tr><td>Module 3</td><td>Properties Of</td><td>Term paper</td><td colspan="3"></td><td>12</td></tr>
</table>

	Bulk Matter			Sessions
Elastic Properties of Materials: Types of Stress and Strain, Stress, Strain equivalence relations, Relation between Elastic constants, stress and strain curve. Bending of beams: neutral surface and neutral axis, expression for bending moment of a beam: Torsion of a cylinder - Expression for twisting couple per unit twist. Torsional pendulum. **Basic concepts of Fluid Mechanics:** Definition of Fluid, concept of continuum, classification of fluids, Fluid Properties, Newton's Law of viscosity, Absolute and Kinematic viscosity, No slip condition				
Module 4	Nano materials and characterization of materials	Term paper	Case study on applications of Nano materials	11 Sessions
Introduction to Nano-materials and Properties, Carbon Nano-tubes (CNT), type of synthesis approach of nano materials, application of nano materials. Characterization of Materials: X-ray diffraction, crystallite size determination by Scherrer equation, X-ray photoelectron spectroscopy (XPS), Scanning Electron Microscopy (SEM), Transmission Electron Microscopy (TEM), Numerical problems.				
Targeted Application & Tools that can be used: 1. Application area in determination of standard values using UTM machine, strength of materials, building materials, machine tools. 2. Microsoft Excel for mathematical calculations. 3. JCPDS data for XRD analysis, ASTM.				
Project work/Assignment: Mention the Type of Project /Assignment proposed for this course				
Assessment Type • Midterm exam • Assignment (review of digital/ e-resource from PU link given in references section - mandatory to submit screen shot accessing digital resource.) • Quiz • End Term Exam • Self-Learning Assignment 1: 1. Identify the crystal planes and directions for a given crystal structure (Schematic) 2. Draw the plane and directions for a given miller indices (Ex. (111), (110), (010), $(1\bar{1}\ 1)$ <110>) 3. Collect the data like, Elastic modulus, Stiffness, Ultimate Tensile Strength, Yield point for a given material. 4. Determine the mechanical properties of given sample (Ex. Aluminum), ASTM standards				
Text Book 1. M.A. Wahab, Structure and Properties of Materials, Solid State Physics, Third Edition, Narosa Publications 2015. 2. Materials Engineering By V. Raghavan, Sixth Edition, Eastern Economy Edition.				
References: 1. Charles P. Poole Jr, Frank J. Owens, Introduction to Nanotechnology, ISBN: 0471079359. Wiley Publications, 2003. 2. P.N. Chandramouli, Fundamentals of Strength of Materials, PHI learning Private Limited, 2013. 3. Chares Kittel, Introduction to Solid State Physics, Wiley publications, 2015. 4. Engineering Physics by Avadhanalu, Revised edition, S. Chand Publications,2018				

Material Physics e-content: https://search.ebscohost.com/login.aspx?direct=true&db=nlebk&AN=754098&site=ehost-live https://search.ebscohost.com/login.aspx?direct=true&db=nlebk&AN=1076817&site=ehost-live https://search.ebscohost.com/login.aspx?direct=true&db=nlebk&AN=18084&site=ehost-live https://search.ebscohost.com/login.aspx?direct=true&db=nlebk&AN=683520&site=ehost-live https://presiuniv.knimbus.com/user#/viewDetail?searchResultType=ECATALOGUE_BASED&unique_id=EBOOKDIRECTORY_1_3517 **https://presiuniv.knimbus.com/user#/searchresult?searchId=material%20physics&_t=1657688744862**	
Topics relevant to development of "FOUNDATION SKILLS": Elastic, thermal and mechanical properties of materials. **Topics relevant to "HUMAN VALUES &PROFESSIONAL ETHICS": Emphasizes team work, self-learning and professional development.**	
Catalogue prepared by	Dr. G. Srinivas Reddy , Dr. Naveen C S ,Dr. Sivasankar Reddy, , Dr. Mahaboob Pasha

Course Code: PHY2506	**Course Title: Fundamentals of Materials Physics Lab** **Type of Course: Basic Science Course and Laboratory only**	**L-T-P-C**	**0**	**0**	**2**	**1**
Version No.	1.0					
Course Pre-requisites	**Class 11 and 12 Physics**					
Anti-requisites	**NIL**					
Course Description	The lab provides practical application of the concepts taught while developing an attitude of enquiry and confidence to tackle new problems. The course also develops team working and report writing skills.					
Course Objective	The objective of the course is **Skill Development** of student by using **Experiential Learning Techniques**.					
Course Outcomes (COs)	On successful completion of the course the students shall be able to: CO1: understand mechanical and thermal properties of materials. CO2: Students can able to Design, build, or assemble a part, product, or system using specific methodologies, equipment and materials**.**					
Course Content:	**Total 30 sessions**					

Experiment 1	Experimental	Data Collection	Analysis and nterpretation
Experimental errors and uncertainty using excel			
Experiment 2	Experimental	Data Collection	Analysis and Interpretation
Determination of rigidity modulus using torsional pendulum			
Experiment 3	Experimental	Data Collection	Analysis and Interpretation
Calculate the spring constant of a set of parallel / series connected springs			
Experiment 4	Experimental	Data Collection	Analysis and Interpretation
To determine the proportionality of Hall Voltage, magnetic flux density and the polarity of Charge carrier.			
Experiment 5	Experimental	Data Collection	Analysis and Interpretation
To plot the characteristics of thermistor and hence find the temperature coefficient of resistance.			
Experiment 6	Experimental	Data Collection	Analysis and Interpretation
Determination of Fermi energy of copper coil			
Experiment 7	Experimental	Data Collection	Analysis and Interpretation
Determination of Dielectric constant of given material			
Experiment 8	Experimental	Data Collection	Analysis and Interpretation
To determine the wavelength of semiconductor diode Laser			
Experiment 9	Experimental	Data Collection	Analysis
Calculation of lattice parameter and particle size using X-ray diffraction pattern			
Experiment 10	Experimental	Data Collection	Analysis

Determine the specific heat capacity of a material using a calorimeter Determination of Stefan's constant and verification of Stefan-Boltzmann Law.
Any 8 experiments will be conducted out of 10
Continuous Internal Assessment: • Midterm exam • Experimental Evaluation • Viva-voce • Endterm exam
Text Book 5. A text book of Engineering physics practical – Dr. Ruby Das 6. **Physics lab manual**
References: Video Links: https://www.youtube.com/@dr.spbasavaraju4939
The topics related to Skill Development All the experiments are relevant to Skill Development through Experiential Learning Techniques. This is attained through assessment component mentioned in course handout.

Catalogue prepared by	Dr. G. Srinivas Reddy , Dr. Naveen C S ,Dr. Sivasankar Reddy, , Dr. Mahaboob Pasha

<table>
<tr><td>Course Code:
MEC2500</td><td colspan="4">Course Title: Engineering Mechanics
Type of Course: Engineering Science Course</td><td>L-T-P-C</td><td>3</td><td>0</td><td>0</td><td>3</td></tr>
<tr><td>Version No.</td><td colspan="9">1.0</td></tr>
<tr><td>Course Pre-requisites</td><td colspan="9">MAT1211</td></tr>
<tr><td>Anti-requisites</td><td colspan="9">NIL</td></tr>
<tr><td>Course Description</td><td colspan="9">This course is a basic course to understand the behaviour of mechanical components. It analyses the components using the principles of Physics and Mathematics. It deals with machines and components in both static and dynamic conditions. The different forces, their planes are well explained. Establishing equilibrium of rigid bodies with focus on moments, couple, vectors are dealt. Concepts of Friction and its types which play an important role in all moving parts are laid out clearly. The centroid, centre of gravity and moment of inertia concepts are dealt in detail.</td></tr>
<tr><td>Course Objective</td><td colspan="9">The objective of the course is to familiarize the learners with the concepts of "Mechanics of Solids" and attain SKILL DEVELOPMENT through Problem solving methodologies.</td></tr>
<tr><td>Course Outcomes</td><td colspan="9">CO1 To understand techniques of analysing forces in statically determinate beams.
CO2 Estimate Centre of Gravity and Moment of Inertia of
CO3 Evaluate friction coefficient in different applications
CO4 Predict the different motion types and their applications</td></tr>
<tr><td>Course Content:</td><td colspan="9"></td></tr>
<tr><td>Module 1</td><td>Forces and equilibrium</td><td>Assignment</td><td>Data collection</td><td>10 Sessions</td></tr>
<tr><td colspan="5">Topics:
Forces in a Plane, Resultant of Forces, Resolution of a Force into Components, Rectangular Components of a Force, Unit Vectors. Equilibrium of a Particle- Newton's First Law of Motion, Space and Free-Body Diagrams.</td></tr>
<tr><td>Module 2</td><td>Centre of Gravity and Moment of Inertia</td><td>Assignment</td><td>Mathematical</td><td>10 Sessions</td></tr>
<tr><td colspan="5">Topics:
Concept and methods of calculation of Centroid, Centre of Gravity and Moment of Inertia.</td></tr>
<tr><td>Module 3</td><td>Friction</td><td>Assignment</td><td>Mathematical</td><td>10 Sessions</td></tr>
<tr><td colspan="5">The Laws of Dry Friction, Coefficients of Friction, Angles of Friction, Wedge friction, Wheel Friction, Rolling Resistance, Ladder friction.</td></tr>
<tr><td>Module 4</td><td>Kinematics</td><td>Assignment</td><td>Mathematical</td><td>15 Sessions</td></tr>
<tr><td colspan="5">Topics: Displacement, speed, velocity, acceleration and their varieties. Newton's Second law of motion, rectilinear and curvilinear motion. Numerical problems. Kinetic Energy of a Particle, Principle of Work and Energy, Principle of Impulse and Momentum, Impact of bodies. D' Alembert's principle and its application.</td></tr>
<tr><td colspan="5">Targeted Application & Tools that can be used:
Application Area is Geophysical phenomenon, Aerospace, Aerodynamics, Microfluidics, Pipe network, Turbo-machinery.
Industries using above applications and tools – Siemens, TATA, Triveni Engineering, GE etc</td></tr>
</table>

TEXTBOOKS:

1. Andy Ruina and Rudra Pratap, Introducing to Statics and Dynamics, Oxford University Press.
2. Bansal R. K., A Text Book of Engineering Mechanics, Laxmi Publications.

Reference Book(s):

1. F. P. Beer, E. R. Johnston (Jr.), and J. T. De Wolf, "Mechanics for Engineers, Statics and Dynamics", McGraw-Hill,
2. Irving H. Shames, Engineering Mechanics, Prentice-Hall.

Web links:

1. https://www.youtube.com/watch?v=VQRcChR9IkU&list=PLOSWwFV98rfKXq2KBphJz95rao7q8Pp_wT&index=18
2. https://play.google.com/store/apps/details?id=appinventor.ai_jgarc322.Resultant_Force

Topics relevant to "SKILL DEVELOPMENT": Friction for **SKILL DEVELOPMENT** through **Problem Solving methodologies**. This is attained through the assessment component mentioned in the course handout.

Catalogue prepared by	Dr. Udaya Ravi M

Course Code: MEC1006	**Course Title: Engineering Graphics** **Type of Course: Engineering Science Course**	**L-T-P-C**	2	0	0	2
Version No.	1.2					
Course Pre-requisites	NIL					
Anti-requisites	NIL					
Course Description	The course is designed with the objective of giving an overview of engineering drawing with the help of software tools. It is introductory in nature and acquaints the students with the techniques used to create engineering drawings with computerized drafting tools. Computerized drafting provides accurate and easily modifiable graphic entities, easy data storage, easy retrieval facility and it enhances creativity. It will expose students to the concept of engineering drawing and teach them to draw different views of planes and solids in different orientations. The course will teach students to use AutoCAD to produce engineering drawings. They will learn to create drawing layouts, dimensioning, the theory of projection, orthographic projection of points, lines, planes and solids, isometric projection and be introduced to the development of surfaces.					
Course Objective	The objective of the course is to familiarize the learners with the concepts of " **Engineering Graphics** " and attain **SKILL DEVELOPMENT** through Problem solving methodologies.					
Course Outcomes	On successful completion of this course the students shall be able to: CO1. Identify and interpret the basic principles, symbols, and conventions of engineering graphics, including lines, scales, lettering, and dimensioning. CO2. Construct basic geometrical shapes and engineering curves (such as ellipse, parabola, cycloid) using appropriate drawing instruments and techniques. CO3. Develop orthographic projections of points, lines, planes, and simple solids in various positions. CO4. Generate and interpret sectional views, true shapes, and developments of surfaces of simple objects and solids. CO5. Visualize and convert 3D objects into isometric views and vice versa from orthographic projections. CO6. Utilize freehand sketching and to communicate engineering ideas effectively through neat, standardized technical drawings.					
Course Content						
Module 1	Introduction to Drawing	Assignment	Standard technical drawing	02 Sessions		
Topics: Introduction, drawing instruments and their uses, relevant BIS conventions and standards, Lettering, Line conventions, dimensioning, Selection of drawing sheet size and scale.						

				[02 Hours: Comprehension Level]
Module 2	Orthographic projections of Points, Straight Lines and Plane Surfaces	Assignment	Projection methods Analysis	10 Sessions
Topics: Introduction, Definitions – Elements of projection and methods of projection, Planes of projection, reference line and conventions adopted. First angle and third angle projections. Projection of Points in all 4 quadrants. Projections of Straight Lines (located in first quadrant/first angle projection only): True and apparent lengths, true and apparent Inclinations to reference planes. (No application problems). Projection of Plane surfaces (First angle projection): Regular plane surfaces – triangle, square, rectangle, pentagon, hexagon and circle – in different positions inclined to both the planes using change of position method only. [10 Hours: Application Level]				
Module 3	Orthographic Projections of Solids	Assignment	Multi-view drawing Analysis	10 Sessions
Topics: Introduction, Projection of right regular prisms, pyramids, cone, hexahedron and tetrahedron in different positions (Problems resting on HP only and First angle projection). [10 Hours: Application Level]				
Module 4	Isometric Projections of Solids (Using isometric scale only)	Assignment	Spatial Visualization	8 Sessions
Topics: Introduction, Isometric scale, Isometric projections of right regular prisms, cylinders, pyramids, cones and their frustums, spheres and hemispheres, hexahedron (cube), and combination of 2 solids, conversion of orthographic view to isometric projection of simple objects. [8 Hours: Application Level]				
Targeted Application & Tools that can be used: Application Area is in understanding and interpreting an object in various positions and converting it into a technical drawing which can be universally accepted. Professionally Used Software: AutoCAD				
Text Book: 1.N. D. Bhatt, "Engineering Drawing: Plane and Solid Geometry," Charotar Publishing House Pvt. Ltd.				
References: 1. K.R. Gopalakrishna, "Engineering Graphics", Subhash Publishers, Bangalore. 2. D. M. Kulkarni, A. P. Rastogi, A. K. Sarkar, "Engineering Graphics with AutoCAD," Prentice Hall. 3. D. A. Jolhe, "Engineering Drawing with Introduction to AutoCAD," Tata McGraw Hill. 4. Engineering Graphics Manual provided by Instructor incharge. **Webresources :** Knimbus - Your Library. Anywhere, Anytime.				

Topics relevant to "SKILL DEVELOPMENT": Projection in first and third angle for **SKILL DEVELOPMENT** through **Problem Solving methodologies**. This is attained through the assessment component mentioned in the course handout.	
Catalogue prepared by	Dr.Yuvaraja Naik

Course Code: ECE1511	**Course Title: Design Workshop** **Type of Course: Engineering Science Course**	**L-T-P-C**	1	0	2	2
Version No.	1.0					
Course Pre-requisites	NIL					
Anti-requisites	NIL					
Course Description	This course is designed to provide an in-depth understanding of Arduino, microcontrollers Raspberry pi and their application in various real time projects involving sensors. Throughout the course, students will learn the fundamentals of Arduino and Raspberry Pi programming and gain hands-on experience with a wide range of sensors. Students will explore how to connect and interface sensors with Arduino and Raspberry Pi boards, read sensor data, and use it to control various output devices This course is suitable for beginners who are interested in exploring the world of electronics and developing practical applications using Arduino, Raspberry Pi and sensors.					
Course Objective	The objective of the course is **Employability Skills** of student by using **PARTICIPATIVE LEARNING** techniques.					
Course Outcomes	**On successful completion of the course the students shall be able to** CO1. Explain the main features of the Arduino & the Raspberry Pi prototype board. CO2. Demonstrate the hardware interfacing of the peripherals to Arduino and Raspberry Pi system. CO3. Understand the types of sensors and its functions CO4. Demonstrate the functioning of live projects carried out using Arduino and Raspberry Pi system**.**					
Course Content:						
Module 1	Basic concepts of Microcontrollers	Hands-on	Interfacing Task and Analysis	3 Sessions		
Topics: Introduction to Arduino, ESP and Node MCU Pin configuration and architecture, Device and platform features, Concept of digital and analog ports, Familiarizing with Arduino Interfacing Board, API's , Introduction to Embedded C and Arduino platform, Arduino Datatypes and variables, Arduino i/o Functions, Arduino Communications, Arduino IDE, Various Cloud Platforms.						
Module 2	Sensory Devices	Hands-on	Interfacing Task and Analysis	3 Sessions		
Arduino Sensors: Humidity Sensor, Temperature Sensor, Water Detector / Sensor, PIR Sensor, Ultrasonic Sensor, Connecting Switches and actuators, sensor interface with Arduino.						

Introduction to 3D Printer: 3D Printer technology and its working Principles, Applications. Introduction to online Simulators: Working with AutoCAD/Fusion 360 Simulator.

Module 3	Introduction to Micro python	Hands-on	Interfacing Task and Analysis	4 Sessions

Topics:
Introduction to MicroPython, Comparison with other programming languages, Setting up the MicroPython development environment, Basics of MicroPython syntax and structure.

Module 4	Working with Raspberry-pi	Hands-on	Interfacing Task and Analysis	5 Sessions

Introduction to raspberry pi boards, pin-diagram, different types of raspberry pi boards and its application, LED and switch control. Mastering Modules, Setup Raspberry - PuTTY SSH,VNC Viewer to interface with more complicated sensors and actuators. Various Libraries and its functions.

Lab: Name of the Experiments:

1. Introduction Lab 1:

Level 1: Overview on Arduino based Micro-controller, and sensors.

Level 2: Interfacing of Arduino and ESP boards with sensors and other components.

2. Lab 2: Smart Plant Monitoring

Level 1- Push button-controlled LED.
Level 2- Automatic Irrigation and monitoring System using Arduino

3. Lab 3: Robotics with Arduino.

Level 1- Servo Motor control using Arduino
Level 2: DC Motor Control Using Arduino for Robotics.

4. Lab 4: Environmental pollution using ESP.

Level 1 - IoT based air Pollution Monitoring System.
Level 2- IoT Based water pollution system

5. Introduction Lab for raspberry pi:

Level 1: Overview on Different Raspberry Pi Boards, and sensors.

Level 2: Configuring the Raspberry Pi and Interfacing with sensors and other components.

6. Lab 7: Raspberry Pi based Object Detection using TensorFlow and OpenCV.
7. Lab 8: Speech Recognition on Raspberry Pi for Voice Controlled Home Automation.
8. Lab 9: Design the website using HTML and CSS, and host the website on Raspberry Pi.
9. Introduction Lab for 3D printing:

Overview of 3D printing. Design of 3D structure using the CAD. Understand the steps of fabrication of simple rectangular box using 3D printer.

10. Lab 10: Design and print of Hollow Cylindrical structure using 3D CAD and 3D printer.
11. Lab 11 Demonstration of Jetson nano board and its capability. (OPTIONAL)
12. Lab 12: Revision
13. Lab 13: Revision
14. Lab 14: Mini Project

15. Lab 15: Mini Project Evaluation.

Topics: Types of Arduino boards, Thonny Python, Python IDLE, **sensors, 3D Printer**

Targeted Application & Tools that can be used:

Application Area:

Home Automation, Environmental Monitoring, Agriculture and Farming, Industrial Automation, Internet of Things (IoT), Robotics, Wearable Devices, Security Systems, Education and Learning. These are just a few examples of the many application areas where Arduino, Raspberry Pi and sensors can be applied. The flexibility and affordability of Arduino, and Raspberry Pi combined with the wide range of sensors available, allow for endless possibilities in creating innovative projects.

Professionally Used Software: Students can use open SOURCE Software's Arduino IDE and Tincker CAD, Thonny Python, Python IDLE etc.

Project work/Assignment:

1. Projects: At the end of the course students will be completing the project work on solving many real time issues.

2. Book/Article review: At the end of each module a book reference or an article topic will be given to an individual or a group of students. They need to refer the library resources and write a report on their understanding about the assigned article in appropriate format. Presidency University Library Link .

3. Presentation: There will be a presentation from interdisciplinary students group, where the students will be given a project on they have to demonstrate the working and discuss the applications for the same

Textbook(s):

1. Monk Simon "Programming Arduino: Getting Started with Sketches", Mc Graw Hill Publications Second Edition
2. Monk Simon "Raspberry Pi Cookbook: Software and Hardware Problems and Solutions", Publisher(s): O'Reilly Media, Inc. ISBN: 9781098130923 fourth Edition.

References

Reference Book(s)

1. Neerparaj Rai "Arduino Projects for Engineers" BPB publishers,first edition, 2016.
2. Ryan Turner "Arduino Programming " Nelly B.L. International Consulting Ltd. first edition,2019.
3. Charles Bell Micro Python for the Internet of Things: A Beginner's Guide to Programming with Python on Microcontrollers" by" Edition 1, 2017, ISBN 978-1-4842-3123-4
4. Stewart Watkiss "Learn Electronics with Raspberry Pi " Apress Berkeley, CA . second edition,2020. ISBN978-1-4842-6348-8
5. Jo Prusa, "Basic of 3D printing", Prusa Research, 3rd edition.
6. Volker Ziemann, "**A Hands-On Course in Sensors Using the Arduino and Raspberry Pi (Series in Sensors)**", CRC Press, 1st Edition. 2018.

Online Resources (e-books, notes, ppts, video lectures etc.):

1. Arduino trending Projects < https://www. https://projecthub.arduino.cc/>
2. Introduction to Arduino < https://onlinecourses.swayam2.ac.in/aic20_sp04/preview>

3. Case studies on Wearable technology< https://www.hticiitm.org/wearables>
4. Raspberry-pi Projects < https://magpi.raspberrypi.com/articles/category/tutorials/>
5. Introduction to internet of things< https://nptel.ac.in/courses/106105166>

E-content:

1. Cattle Health Monitoring System Using Arduino and IOT (April 2021| IJIRT | Volume 7 Issue 11 | ISSN: 2349-6002)
2. M H Hemanth Kumar, Ravi Pratap Singh, Nishu Sharma, Pragya Singh" IOT BASED SMART SECURITY SYSTEM USING ARDUINO" 2021 JETIR August 2021, Volume 8, Issue 8.

3. R. Maheswar, P. Jayarajan, S. Vimalraj, G. Sivagnanam, V. Sivasankaran and I. S. Amiri, "Energy Efficient Real Time Environmental Monitoring System Using Buffer Management Protocol," 2018, pp. 1-5, doi: 10.1109/ICCCNT.2018.8494144. https://ieeexplore.ieee.org/document/8494144.

4. Yaser S Shaheen,Hussam., " Arduino Mega Based Smart Traffic Control System ," December 2021 Asian Journal of Advanced Research and Reports 15(12): 43-52, 2021(15(12): 43-52, 2021):15(12): 43-52, 2021.

5. Basil, Eliza Sawant, S.D. "IoT based traffic light control system using Raspberry Pi " DOI 10.1109/ICECDS.2017.8389604

6. Supriya S, 2Dr. Aravinda " Green leaf disease detection and identification using Raspberry Pi https://www.irjet.net/archives/V9/i8/IRJET-V9I847.

7. Dr. E.N. Ganesh., "Health Monitoring System using Raspberry Pi and IOT" DOI : http://dx.doi.org/10.13005/ojcst12.01.03

Topics relevant to development of "SKILL": System design for achieving Sustainable Development Goals.

Catalogue prepared by	Dr Ashutosh Anand

Course Code: ENG2501	**Advanced English Communication**	**L- T- P- C**	2	0	0	2
Version No.	1.0					
Course Pre-requisites	ENG1900 English for Technical Communication					
Anti-requisites	**NIL**					
Course Description	This course is designed to equip students to enhance their communication abilities in Listening, Speaking, Reading, and Writing. The curriculum covers interpersonal communication principles, the art of speech writing and delivery (including impromptu speaking), strategic approaches to critical reading, the identification of logical fallacies, and persuasive writing. Furthermore, the course will introduce students to the potential of AI tools and the techniques of prompt engineering to elevate their communication skills in the digital age. Upon course completion, students will be well-prepared to communicate effectively and critically in both academic and professional environments.					
Course Objective	To equip students with advanced communication skills by engaging them in structured speech writing, spontaneous speaking exercises, and the practical application of prompt engineering. The course fosters critical thinking, creativity, and adaptability in both human and AI-assisted communication contexts.					
Course Outcomes	On successful completion of the course the students shall be able to: 1. **Recognize** the elements of interpersonal and cross-cultural communication to address communication challenges effectively. 2. **Demonstrate** the ability to deliver structured and impromptu speeches using effective speaking techniques. 3. **Interpret** textual and visual materials using critical reading strategies to evaluate arguments, logic, and persuasion. 4. **Produce** persuasive and analytical essays using effective argumentation techniques and structured writing strategies.					
Course Content:						
Module 1	Foundations of Effective Communication	Case Studies/ Role play	Cross-Cultural Competency	8 Sessions		
Topics: • Fundamentals of Interpersonal Communication • Verbal, Non-verbal, and Paraverbal communication. • Cultural dimensions theory (Hofstede's Cultural Dimensions). • Active Listening Techniques						
Module 2	Mastering Speech Delivery	JAM	Public Speaking	8 Sessions		

<table>
<tr><td></td><td></td><td></td><td>Confidence</td><td></td></tr>
<tr><td colspan="5">Topics:
Introduction to Prompt Engineering
Speech Preparation and Organization
Techniques for Effective Impromptu Speaking
Practice Speech Delivery</td></tr>
<tr><td>Module 3</td><td>Critical Reading and Logical Analysis</td><td>Worksheet</td><td>Critical Thinking and Analysis</td><td>7 Sessions</td></tr>
<tr><td colspan="5">Topics:
Critical Reading Strategies: Contextualizing, Figurative Language, Evaluating Logic of an Argument, Recognizing Emotional Manipulation, Analysing Visuals
Recognizing Logical Fallacies: Slippery Slope, False Dilemma, Post Hoc, Hasty Generalization,
Ad Hominem, Straw Man, Bandwagon, No True Scotsman, Red Herring, Appeal to Authority, Sunk Cost, Appeal to ignorance</td></tr>
<tr><td>Module 4</td><td>Writing Effective Arguments</td><td>Assignment</td><td>Clear and Coherent Writing</td><td>7 Sessions</td></tr>
<tr><td colspan="5">Topics:
Understanding Critical Writing
Building Arguments (Pathos, Ethos, Logos)
Techniques for Persuasion</td></tr>
<tr><td colspan="5">Targeted Application & Tools that can be used: Quizziz, Chatgpt, Gemini, Youtube, Instagram, Quillbot, Grammarly, Padlet</td></tr>
<tr><td colspan="5">References
Adler, R. B., Rodman, G., & DuPré, A. (2019). Understanding human communication (14th ed.). Oxford University Press.
Moore, B. N., & Parker, R. (2020). Critical thinking (13th ed.). McGraw-Hill Education.
DeVito, J. A. (2019). The interpersonal communication book (15th ed.). Pearson.
Ting-Toomey, S., & Dorjee, T. (2018). Intercultural competence: A model for teaching and assessing cross-cultural communication. Journal of Intercultural Communication, 47(2), 213–229. https://doi.org/10.1016/j.jicc.2018.03.004
https://www.ted.com/</td></tr>
<tr><td colspan="5">Topics Relevant to “employability”: Teamwork and Collaboration, Critical Thinking and Problem- Solving
Topics Relevant to “Human Values and Professional Ethics”: Critical reasoning, Inclusivity and Fairness</td></tr>
<tr><td>Catalogue prepared by</td><td colspan="4">Dr. Tychicus David</td></tr>
</table>

<table>
<tr><td>Course Code:
DES1146</td><td colspan="3">Course Title: Introduction to Design Thinking
Type of Course: Theory</td><td>L-T-P-C</td><td>1</td><td>0</td><td>0</td><td>1</td></tr>
<tr><td>Version No.</td><td colspan="8">1.0</td></tr>
<tr><td>Course Pre-requisites</td><td colspan="8">NIL</td></tr>
<tr><td>Anti-requisites</td><td colspan="8">NIL</td></tr>
<tr><td>Course Description</td><td colspan="8">The course aims to introduce concepts of Design thinking and orient the students towards importance of design thinking, its definition and applications keeping Human Centric Design as pivotal. Emphasizing how it can be applied to solve complex problems, innovate, and create user-centered solutions. Students will engage in hands-on learning through exercises, case studies, and projects, fostering creative problem-solving skills and an iterative approach to design. By the end of the course, students will be equipped to apply the design thinking process to various fields, including product development, service design, business innovation, and social entrepreneurship and will have gained the foundational knowledge and practical experience to approach real-world problems using design thinking.</td></tr>
<tr><td>Course Objective</td><td colspan="8">The objective of the course is promoting Entrepreneurship for students by using PARTICIPATIVE LEARNING Techniques.</td></tr>
<tr><td>Course Outcomes</td><td colspan="8">On successful completion of the course the students shall be able to:
CO1. Describe Design thinking essentials
CO2. Discover grey areas in chosen designs
CO3. Interpret design flaws with possible solutions</td></tr>
<tr><td>Course Content:</td><td colspan="8">All assignments and projects must be developed using the reference materials available from the PU e-resource database – JSTOR, EBSCO, Library OPAC, NPTEL Videos, etc.</td></tr>
<tr><td>Module 1</td><td colspan="2">Introduction to Design Thinking</td><td>Visual journal, Case studies, User research, context-specific assignment/project</td><td>Visual output generation- Visual Journal and narrative and Prototype development.</td><td colspan="4">3 Sessions</td></tr>
<tr><td colspan="9">Topic
1) Definition and introduction to Design Thinking (Evolution)
2) Understanding Design Thinking-Conceptual and contextual meaning of Design Thinking</td></tr>
</table>

Module 2	Design flaws and Interpretations	Visual journal. Documentation (Project reports) Prototypes of Major & Minor Projects	Visual output generation, narrative development & Prototypes of Products/processes	12 Sessions

Topics:

1) Steps in Design Thinking (SCAMPER, Double Diamond)
2) IDEO tool kit- EDIPT
3) D-School HCD principles
4) Problems. Ill-defined, well defined
5) Definition of design flaw and its Identification-Discovering a bottleneck in process/Product/Understanding
6) Observational studies on design flaws in various areas of application with possible solutions - Two case studies (Major and Minor)
7) Purposeful designs

Targeted Application & Tools that can be used:

1) Design ideation and concept development for innovative projects—SCAMPER/EDIPT
2) Double diamond concept.

Text Book

Thinking Design by S Balaram. New Delhi [India]: Sage Publications Pvt. Ltd. 2010. eBook., Database: eBook Collection (EBSCOhost) https://puniversity.informaticsglobal.com:2284/ehost/detail/detail?vid=6&sid=18ab1f43-1f92-4d02-ae2e-a9c06dc06d8c%40redis&bdata=JnNpdGU9ZWhvc3QtbGl2ZQ%3d%3d#AN=354920&db=nlebk

References

Design Thinking by Clarke, Rachel Ivy. Series: Library Futures, Vol. 4. Chicago: ALA Neal-Schuman. 2020. eBook., Database: eBook Collection (EBSCOhost)

Catalogue prepared by	Dr. Ashok A Itagi

<table>
<tr><td>Course Code:

PPS1026</td><td colspan="2">Course Title: Industry Readiness Program – II (Audited Course)
Type of Course: Practical Only Course</td><td>L- T - P- C</td><td>0</td><td>0</td><td>2</td><td>0</td></tr>
<tr><td>Version No.</td><td colspan="7">1.0</td></tr>
<tr><td>Course Pre-requisites</td><td colspan="7">• Students are expected to understand Basic English.
• Students should have desire and enthusiasm to involve, participate and learn.</td></tr>
<tr><td>Anti-requisites</td><td colspan="7">NIL</td></tr>
<tr><td>Course Description</td><td colspan="7">This course is designed to enable students learn styles of communication, team building and use empathy in leadership. The course will benefit learners in preparing themselves effectively through various activities and learning methodologies.</td></tr>
<tr><td>Course Objective</td><td colspan="7">The objective of the course is to familiarize the learners with the concepts of “Industry Readiness for Young Professionals” and attain SKILL DEVELOPMENT through PARTICIPATIVE LEARNING techniques.</td></tr>
<tr><td>Course Out Comes</td><td colspan="7">On successful completion of this course the students shall be able to:
CO 1 Apply different communication skills for success in workplace
CO 2 Practice team building skills for career success
CO3 Demonstrate ethical leadership skills in workplace</td></tr>
<tr><td>Course Content</td><td colspan="7"></td></tr>
<tr><td>Module 1</td><td>Effective Communication</td><td colspan="2">Classroom activities</td><td colspan="2"></td><td colspan="2">10 Sessions</td></tr>
<tr><td colspan="8">Topics: Practice effective communication skills (Verbal, Non-verbal, Written and Visual)

Activity: Use social media prompts to prepare self-introduction videos</td></tr>
<tr><td>Module 2</td><td>Team Building</td><td colspan="2">Group Activity</td><td colspan="2"></td><td colspan="2">10 Sessions</td></tr>
<tr><td colspan="8">Topics: Skills of an effective team player

Activity: Student group activity to build class networking</td></tr>
<tr><td>Module 3</td><td>Leadership</td><td colspan="2">Case study</td><td colspan="2"></td><td colspan="2">10 Sessions</td></tr>
</table>

Topics: Types of leadership, using empathy in leadership **Activity:** Individual presentation by students on corporate leaders.
Targeted Application & Tools that can be used: 1. TED Talks 2. You Tube Links Activities
Assignment proposed for this course Assignment 1: One minute reel Assignment 2: Team building assignment
Continuous Individual Assessment Module 1: L-S-R-W class assessment Module 2: Team Presentation Module 3: Individual Assessment
The topics related to skill development: Students acquire knowledge on effective communication skills, team building skills and how to prepare themselves to be leaders in workplace using empathy and implement various skill sets during the course of their time in the university.

Catalogue prepared by	Faculty of L&D

Course Code: **CHE7601**	**Environmental Studies** **Type of Course: MOOC course**	**L- T- P- C**	-	-	-	-
		Contact hours	-	-	-	-
Course Pre-requisites	NIL					
Anti-requisites	**NIL**					
Course Description	This course is designed to improve the learners' SKILL DEVELOPMENT by using PATICIPATIVE LEARNING techniques. This course aims to familiarize students with fundamental environmental concepts and their relevance to business operations, preparing them to address forthcoming sustainability challenges. It is designed to equip students with the knowledge and skills needed to make decisions that account for environmental consequences, fostering environmentally sensitive and responsible future managers. **This course is designed to cater to Environment and Sustainability**					
Course Objective	The objective of the course is **'SKILL DEVELOPMENT'** of the student by using **'PARTICIPATIVE LEARNING'** techniques					
Course Outcomes	On successful completion of this course the students shall be able to: CO1. Describe the issues related to natural resources, ecosystems and biodiversity CO2. Identify environmental hazards affecting air, water and soil quality CO3. Recognize the importance of healthy environment and finding the sustainable methods to protect the environment CO4. Convert skills to address immediate environmental concerns through changes in environmental processes, policies, and decisions					
Course Content:						
Module 1	Understanding Environment, Natural Resources, and Sustainability					
Topics: Classification of natural resources, issues related to Population growth and their overutilization, and strategies for their conservation. Water, air, soil, mineral, energy and food source. Effect of human activities on natural resources. Concept of sustainability- Sustainable Development Goals (SDGs)- targets and indicators, challenges and strategies for SDGs; Sustainable practices in managing resources, including deforestation, water conservation, Desalination – types, energy security, and food security issues, Life Cycle thinking and Circular Economy.						
Module 2	Ecosystems, Biodiversity, and Sustainable Practices					
Topics: **Ecosystems and ecosystem services:** Various natural ecosystems, Major ecosystem types in India and their basic characteristics; forests, wetlands, grasslands, agriculture, coastal and marine; Ecosystem services- classification and their significance. The importance of biodiversity, Types of biodiversity, Biodiversity and Climate Change, the threats it faces, hotspots, and the methods used for its conservation. Strategies for in situ and ex situ conservation, mega diverse nation.						
Module 3	Environmental Pollution, Waste Management, and Sustainable					

	Development			

Topics:
Types of pollution- Chemical, - Biological, Biomedical, noise, air, water, soil, thermal, radioactive and marine pollution, and their impacts on society. Urbanization and Urban environmental problems; effects, and mitigation.
Causes of pollution, such as global climate change, ozone layer depletion, the greenhouse effect, and acid rain, with a particular focus on pollution episodes in India. Importance of adopting cleaner technologies; Solid waste management;

Sustainable Materials and Technologies: Biodegradable and compostable materials, Recycled and reclaimed materials (E-waste management), Sustainable manufacturing processes.

Module 4	Social Issues, Legislation, and Practical Applications			

Topics:
Overview of key environmental legislation and the judiciary's role in environmental protection, including the Water (Prevention and Control of Pollution) Act of 1974, the Environment (Protection) Act of 1986, and the Air (Prevention and Control of Pollution) Act of 1981. Hazardous waste Rule 1989, Biomedical Waste handling 1998, Fly Ash Rule 1999, Municipal Solid Waste Rule 2000, Battery Rules 2001, E- Waste Rules 2011, Plastic waste management Rules 2016, Construction Demolition waste Rules 2016 National Biodiversity Action Plan (NBAP)
Major International Environmental Agreements: Convention on Biological Diversity (CBD), The Biological Diversity (Amendment) Act, 2023, United Nations Framework Convention on Climate Change (UNFCCC); Kyoto Protocol; Paris Agreement.
Major International organisations and initiatives: United Nations Environment Programme (UNEP), United Nations Educational, Scientific and Cultural Organization (UNESCO), Intergovernmental Panel on Climate Change (IPCC).

Targeted Application & Tools that can be used:
Application areas are Energy, Environment and sustainability
Tools: Online Tools – NPTEL and Swayam.

Project work/Assignment:

Assessment Type
- Online exams (MCQs) will be conducted by the department of Chemistry

Online Link*:
1) Lecture by Dr. Samik Chowdhury, Dr. Sudha Goel, NPTEL course: Environmental Science, https://nptel.ac.in/courses/109105203, 2024.
2) Lecture by Dr. Padmavati, Dr Narendran Thiruthy, NPTEL Course: Biodiversity Protection, Farmers and Breeders Rights, https://nptel.ac.in/courses/129105008, 2024.

* Other source links are available in below Resources link.

Text Book

1. G. Tyler Miller and Scott Spoolman (2020), Living in the Environment, 20th Edition, Cengage Learning, USA
2. Poonia, M.P. Environmental Studies (3rd ed.), Khanna Book Publishing Co.
3. Bharucha, E. Textbook of Environmental Studies (3rd ed.) Orient Blackswan Private Ltd.
4. Dave, D., & Katewa, S. S. Text Book of Environmental Studies. Cengage Learning India Pvt Ltd.
5. Rajagopalan, R. Environmental studies: from crisis to cure (4th ed.). Oxford University Press.
6. Basu, M., & Xavier Savarimuthu, S. J. Fundamentals of environmental studies. Cambridge University Press.

7. Roy, M. G. Sustainable Development: Environment, Energy and Water Resources. Ane Books.
8. Pritwani, K. Sustainability of business in the context of environmental management. CRC Press.
9. Wright, R.T. & Boorse, D.F. Environmental Science: Toward A Sustainable Future (13th ed,). Pearson.

Reference Books

1. Varghese, Anita, Oommen, Meera Anna, Paul, Mridula Mary, Nath, Snehlata (Editors) (2022), Conservation through Sustainable Use: Lessons from India. Routledge.
2. William P. Cunningham and Mary Ann Cunningham (2020), Principles of Environmental Science: Inquiry & Applications, 9th Edition, McGraw-Hill Education, USA.
3. Richard A. Marcantonio, Marc Lame (2022). Environmental Management: Concepts and Practical Skills. Cambridge University Press.
4. Manahan, S.E. (2022). Environmental Chemistry (11th ed.). CRC Press. https://doi.org/10.1201/9781003096238
5. Theodore, M. K. and Theodore, Louis (2021) Introduction to Environmental Management, 2nd Edition. CRC Press

Resources:

1. https://nptel.ac.in/courses/109105203
2. https://archive.nptel.ac.in/courses/120/108/120108004/
3. https://nptel.ac.in/courses/127105018
4. https://onlinecourses.nptel.ac.in/noc23_lw06/preview
5. https://onlinecourses.swayam2.ac.in/ini25_bt02/preview
6. https://archive.nptel.ac.in/courses/120/108/120108002/
7. https://onlinecourses.swayam2.ac.in/ini25_bt02/preview
8. https://nptel.ac.in/courses/102104088
9. https://nptel.ac.in/courses/124107165
10. https://nptel.ac.in/courses/109106200
11. https://archive.nptel.ac.in/content/storage2/courses/120108004/module1/lecture1.pdf
12. https://onlinecourses.swayam2.ac.in/nou25_ge19/preview
13. https://onlinecourses.swayam2.ac.in/ini25_hs01/preview
14. http://kcl.digimat.in/nptel/courses/video/105105184/L32.html
15. https://nptel.ac.in/courses/105105169

Topics relevant to Skill Development:

1. An attitude of enquiry.
2. Write reports

The topics related to Environment and Sustainability:

topics in theory component are relevant to Environment and Sustainability.

Catalog prepared by	Faculty members of the Department of Chemistry