

Department of Metallurgical & Material Engineering

Ahmadu Bello University Zaria

Curriculum

The Metallurgical and Materials Engineering (MMEN) curriculum will be organized to provide three educational components:

1. Fundamentals of metallurgical and materials, applications of the fundamentals and emphasis in one of three focus areas.
 - a) MMEN Basics: The basic curriculum in the Metallurgical and Materials Engineering Department will provide a background in the following topic areas:
 - i. Crystal structures and structural analysis: Crystal system; symmetry elements and Miller indices; atomic bonding; metallic, ceramic and polymeric structures; x-ray and electron diffraction; stereographic projection and crystal orientation; long range order defects in materials.
 - ii. Thermodynamics of materials: Heat and mass balances; thermodynamic laws; chemical potential and chemical equilibrium; solution thermodynamics and solution models; partial molar and excess quantities; solid state thermodynamics; thermodynamic of surfaces etc.
 - iii. Phase equilibria: Phase rule; binary and ternary systems; microstructural evolution; defects in crystals; surface phenomena; phase transformations; eutectic, eutectoid, martensitic, nucleation and growth recovery; strengthening mechanisms; quantitative stereology and heat treatment.
 - iv. Properties of materials: Mechanical properties, chemical properties (oxidation and corrosion); electrical, magnetic and optical properties; failure analysis.
 - b) MMEN Applications: The course content in the Metallurgical and Materials Engineering programme emphasized the following applications:
 - i. Materials processing: Particulate processing, thermo- and electro-chemical materials processing, hydrometallurgical processing, synthesis of materials, deformation processing, casting and welding.
 - ii. Design and application of materials: Materials selection, ferrous and non-ferrous metals, ceramic materials, polymeric materials, composite materials and electronic materials.
 - c) MMEN Focus Areas: There are three focus areas within the Metallurgical and Materials Engineering curriculum. These are:
 - i. Physico-chemical processing of materials.
 - ii. Physical-mechanical metallurgy.
 - iii. Materials engineering

Course Credit System

The course units in the Department are organized on the course credit system per semester. A semester lasts for approximately 18 weeks, including the periods of registration and examinations provided that not less than 15 weeks are devoted to actual teaching. One credit unit is the equivalent of 15 contact hours of classroom teaching or 30 hours of laboratory work. Most of the course units in the Department carry the weight of 3 or 2 credit units, suggesting that they are taught for 45 or 30 hours in the semester or 3 or 2 one-hour periods per week. In courses with strong practical component, this means that there are 15 hours of teaching and 45 hours of practical to qualify for 2 credit units or 30 hours of teaching and 45 hours of practical for 3 credit unit courses. However, there are fewer 3 credit unit courses which suggest that more work is required to be done in 45 contact hours per semester or the equivalent in terms of practical and classroom teaching. At the end of each semester, a final examination is given to bring the course to final conclusion. The final examination in each course unit is weighted 60% of the component while CA/assignments carries the weight of 40% of total marks for the course. No student can pass in a course unit if he/she fails to submit the CA/assignments.

Computing Grade Point Average (GPA) and Cumulative Grade Point Average (CGPA)

Using an example of a 100 level student in the Department with the following results in the first semester: and second semester, the GPA and CGPA are computed as follows:
First semester

| Course | Grades | Grade points | Credit Units | Credit points (c*d) |
|----------|--------|--------------|--------------|---------------------|
| PHYS 111 | 65(B) | 4 | 2 | 8 |
| PHYS 131 | 73(A) | 5 | 2 | 10 |
| PHYS 161 | 70(A) | 5 | 1 | 5 |
| CHEM 111 | 63(B) | 4 | 2 | 8 |
| STAT 101 | 72(A) | 5 | 1 | 5 |
| MATH 101 | 73(A) | 5 | 1 | 5 |
| MATH 103 | 67(B) | 4 | 1 | 4 |

| | | | | |
|----------|-------|---|----|----|
| MATH 105 | 75(A) | 5 | 1 | 5 |
| MATH 107 | 47(D) | 2 | 1 | 2 |
| GEOL 101 | 41(E) | 1 | 2 | 2 |
| CHEM 121 | 57(C) | 3 | 2 | 6 |
| | | | 16 | 60 |

Registered Credit Units (RCU) = 2+2+1 +1 +2+1+1+1+1 +2+2+2 = 16

Earned Credit Units (ECU) = 2+2+1 +2+1+1 +1+1 ++2+2 = 16

Thus, First Semester Grade points average (GPA) = 60/16 = 3.75

Second semester

| Course | Grades | Grade points | Credit Units |
|----------|--------|--------------|--------------|
| PHYS 112 | 75(A) | 5 | 2 |
| PHYS 142 | 72(A) | 5 | 1 |
| PHYS 162 | 64(B) | 4 | 1 |
| MATH 102 | 69(B) | 4 | 2 |
| MATH 104 | 70(A) | 5 | 2 |
| MATH 106 | 78(A) | 5 | 2 |
| MATH 108 | 75(A) | 5 | 1 |
| COSC 100 | 752(A) | 5 | 2 |
| CHEM 112 | 56(C) | 3 | 2 |
| | | | 15 |

Thus for second semester (GPA) = 68/15 = 4.53

CGPA = Previous TCP + Present CP/Previous TRCU + Present RCU

Where: TCP: Total Credit Points

| | | | | |
|--------------|-------------------|-------------------|---------------|----------------|
| CP: | | Credit | | Points |
| TRCU: | Total | Registered | Credit | Units |
| RCU: | Registered | | Credit | Units |
| CGPA: | Cumulative | Grade | Point | Average |

Hence,

$$\text{CGPA} = 60 + 68/16 + 15 = 4.13$$