# KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY (KNUST), KUMASI

# CoE, FMCE

Department of Mechanical Engineering

## BSc Mechanical Engineering

Brochure 2021

## 1. Brief Description

The BSc. Mechanical Engineering programme is one of the founding Bach elor of Science programmes that started the formerly known School of Eng ineering after the University was established in 1961. The University award ed its first batch of students in BSc. Mechanical Engineering in 1964. The programme has been one of the most attractive to prospective engineering s tudents. Mechanical engineers work in industries like manufacturing, auto mobile, marine, energy, food and agro-processing, nuclear, aerospace and railways.

## 2. Aims and Objective

The aim of the Mechanical Engineering programme is to provide broad-based education and training in mechanical engineering sciences and their applications to equip graduates to meet the challenges of the engineering profession in a developing country like Ghana. Upon successful completion of the programme, the graduate should be able to:

a. Design, manufacture and assemble spacecraft, mechanical components and systems,
b. Solve engineering problems by analysis and empirical methods, including application of the computer,
c. Install, commission, operate, maintain and service spacecraft, machinery, tools and equipment,
d. Prepare and read engineering drawings,
e. Prepare and present engineering reports, and
f. Apply relevant social science principles to manage engineering organisations and maintain cordial human relations.

## 3. Entry Requirement

1. WASSCE/SSSCE applicants should have credits in Elective Mathematics, Elective Physics and any one of the following
   i. Chemistry
   ii. Metalwork
   iii. Auto Mechanics
   iv. Applied Electricity
   v. Technical and Engineering Science
2. WASSCE/SSSCE applicants without Chemistry should at least **B3** in Integrated Science.
3. Mature applicants must be twenty-five (25) years or more at the time of submitting the application.
4. Mature applicants must have a minimum of three (3) years relevant working experience at the time of submitting the application.
5. Mature applicants must possess WASSCE/SSSCE, A' Level Certificate or an HND from a recognized institution.
6. International Baccalaureate applicants may be admitted if the contents of such programmes are found to be equivalent to the WASSCE/SSSCE programme or the A' Level programme.

## 4. Course Structure

*Note: Course codes ending with odd digits are 1st-semester courses while codes ending with even digits are 2nd-semester courses.*

### Year One Semester One

| SN | Course Code | Course Title | Credit |
|---|---|---|---|
| 1 | MATH 151 | Algebra | 4 |
| 2 | ENGL 157 | Communication Skills I | 2 |
| 3 | EE 151 | Applied Electricity | 3 |
| 4 | CE 155 | Environmental Studies | 2 |
| 5 | ME 159 | Technical Drawing | 3 |
| 6 | ME 195 | Engineering Technology | 2 |
| 7 | ME 157 | Introduction to Information Technology | 2 |

### Year One Semester Two

| SN | Course Code | Course Title | Credit |
|---|---|---|---|
| 1 | MATH 152 | Calculus with Analysis | 4 |
| 2 | ENGL 158 | Communication Skills II | 2 |
| 3 | EE 152 | Basic Electronics | 3 |
| 4 | ME 160 | Engineering Drawing | 3 |
| 5 | ME 164 | Statics of Solid Mechanics | 2 |
| 6 | ME 158 | Computer Programming for Engineers | 2 |
| 7 | ME 174 | First Year Design Project | 2 |

### Year Two Semester One

| SN | Course Code | Course Title | Credit |
|---|---|---|---|
| 1 | MATH 251 | Differential Equations | 4 |
| 2 | ENGL 263 | Literature in English I | 1 |
| 3 | ME 261 | Dynamics of Solid Mechanics | 2 |
| 4 | ME 251 | Introduction to Fluid Mechanics | 2 |
| 5 | ME 281 | Engineering Materials I | 2 |
| 6 | ME 255 | Strength of Materials I | 3 |
| 7 | ME 259 | Applications of Computer Graphics | 3 |
| 8 | ME 295 | Mechanical Engineering Laboratory I | 1 |

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### Year Two Semester Two

| SN | Course Code | Course Title | Credit |
|---|---|---|---|
| 1 | MATH 252 | Calculus with Several Variables | 4 |
| 2 | ENGL 264 | Literature in English II | 1 |
| 3 | ME 270 | Manufacturing Technology | 3 |
| 4 | ME 262 | Mechanisms Synthesis and Analysis I | 3 |
| 5 | ME 252 | Fluid Dynamics I | 2 |
| 6 | ME 266 | Thermodynamics I | 2 |
| 7 | ME 274 | Second Year Design Project | 2 |
| 8 | ME 296 | Mechanical Engineering Laboratory II | 1 |

### Year Three Semester One

| SN | Course Code | Course Title | Credit |
|---|---|---|---|
| 1 | MATH 353 | Probability and Statistics | 2 |
| 2 | MATH 351 | Numerical Methods | 2 |
| 3 | ME 363 | Automatic Control I | 2 |
| 4 | ME 365 | Thermodynamics II | 3 |
| 5 | ME 395 | Mechanical Engineering Lab III | 1 |
| 6 | ME 373 | Machine Elements Design | 3 |
| 7 | ME 361 | Dynamics of Machinery | 3 |
| 8 | ECON 151 | Introduction to Economics I | 2 |

### Year Three Semester Two

| SN | Course Code | Course Title | Credit |
|---|---|---|---|
| 1 | ME 356 | Strength of Materials II | 2 |
| 2 | ME 392 | Industrial Engineering and Ergonomics | 2 |
| 3 | ME 374 | Machine Design | 2 |
| 4 | ME 352 | Fluid Dynamics II | 3 |
| 5 | ME 366 | Heat Transfer | 3 |
| 6 | ME 362 | Vibrations I | 3 |
| 7 | ME 396 | Mechanical Engineering Lab IV | 1 |
| 8 | ME 252 | Electrical Engineering Machines | 2 |

**YEAR FOUR**

Final year students are required to specialise in one of the following options:

1. Applied Mechacnics
2. Design and Manufacturing
3. Thermo-fluids and Energy Systems Engineering
4. Automobile Engineering
5. Industrial Engineering.

Students will choose at least two and one core course(s), respectively, in the first and the second semesters from their areas of specialisation and then take any of the courses offered in any of the other areas, including those listed as electives, to bring the minimum credits per semester to 17 and also ensure the minimum of 140 credit hours required to graduate.

### Year Four Semester One – Core Courses

| SN | Course Code | Course Title | Credit |
|---|---|---|---|
| 1 | ME 453 | Hydraulics and Pneumatics | 3 |
| 2 | ME 491 | Engineering Economy and Management | 2 |
| 3 | ME 497 | Final Year Project I | 3 |
| 4 | *** | Mechanical Engineering Elective I | 3 |
| 5 | *** | Mechanical Engineering Elective II | 3 |
| 6 | *** | Mechanical Engineering Elective III | 2 |

#### *Applied Mechanics*

| SN | Course Code | Course Title | Credit |
|---|---|---|---|
| 1 | ME 461 | Vibrations II | 3 |
| 2 | ME 463 | Automatic Control II | 3 |
| 3 | ME 455 | Strength of Materials III | 3 |

#### *Automobile Engineering*

| SN | Course Code | Course Title | Credit |
|---|---|---|---|
| 1 | ME 485 | Design of Vehicle Structures | 3 |
| 2 | ME 489 | Maintenance and Management of Transport | 3 |
| 3 | ME 487 | Vehicle Power Train Systems | 3 |

#### *Design and Manufacturing Engineering*

| SN | Course Code | Course Title | Credit |
|---|---|---|---|
| 1 | ME 471 | Machine Tools Design | 3 |
| 2 | ME 473 | Computer Aided Design and Manufacturing | 3 |
| 3 | ME 477 | Production Engineering I | 3 |

#### *Industrial Engineering*

| SN | Course Code | Course Title | Credit |
|---|---|---|---|
| 1 | ME 469 | Facilities Design | 3 |
| 2 | ME 457 | Discrete Event Simulation | 3 |
| 3 | ME 499 | Operations Research | 3 |

#### *Thermo-fluids and Energy Systems Engineering*

| SN | Course Code | Course Title | Credit |
|---|---|---|---|
| 1 | ME 451 | Behaviour of Real Fluids | 3 |
| 2 | ME 465 | Air Conditioning and Refrigeration | 3 |
| 3 | ME 467 | Renewable Energy Conversion | 2 |

#### *Technical Electives*

| SN | Course Code | Course Title | Credit |
|---|---|---|---|
| 1 | ME 481 | Engineering Materials II | 2 |
| 2 | MSE 451 | Composite Materials | 3 |
| 3 | ME 483 | Mechatronics | 3 |

### Year Four Semester Two

| SN | Course Code | Course Title | Credit |
|---|---|---|---|
| 1 | ME 492 | Entrepreneurship Development and Management | 2 |
| 2 | ME 464 | Instrumentation | 2 |
| 3 | ME 498 | Final Year Project II | 5 |
| 4 | ME 494 | Maintenance Engineering | 3 |
| 5 | ME *** | Mechanical Engineering Elective IV | 3 |
| 6 | ME *** | Mechanical Engineering Elective V | 2 |

### Electives from Area of Specialisation

#### *Applied Mechanics*

| SN | Course Code | Course Title | Credit |
|---|---|---|---|
| 1 | ME 461 | Vibrations II | 3 |
| 2 | ME 463 | Automatic Control II | 3 |

#### *Automobile Engineering*

| SN | Course Code | Course Title | Credit |
|---|---|---|---|
| 1 | ME 486 | Vehicle Control, Suspension and Stability | 3 |
| 2 | ME 468 | Internal Combustion Engines | 3 |

#### *Design and Manufacturing Engineering*

| SN | Course Code | Course Title | Credit |
|---|---|---|---|
| 1 | ME 472 | Machine Shop and Factory Design | 3 |
| 2 | ME 478 | Production Engineering II | 3 |

#### *Industrial Engineering*

| SN | Course Code | Course Title | Credit |
|---|---|---|---|
| 1 | ME 494 | Human Factors & Ergonomics | 3 |
| 2 | ME 474 | Production Planning and Control | 3 |

#### *Thermo-fluids and Energy Systems Engineering*

| SN | Course Code | Course Title | Credit |
|---|---|---|---|
| 1 | ME 452 | Fluid Machinery | 3 |
| 2 | ME 468 | Internal Combustion Engines | 3 |

#### *Technical Electives*

| SN | Course Code | Course Title | Credit |
|---|---|---|---|
| 1 | ME 482 | Engineering Materials Processing | 2 |
| 2 | ME 470 | Automation and Production Systems | 2 |
| 3 | ME 488 | Automotive Electrical and Electronic Systems | 3 |

## 5. Graduation Requirement

A student can only graduate when he or she has obtained a minimum of 142 credit hours, passed all required courses and obtained a minimum Cumulative Weighted Average (CWA) of 45 %. A graduating student should have also done a minimum of 14 weeks in supervised industrial work.