BSC. AGRICULTURAL AND BIOSYSTEMS ENGINEERING

Introduction

Increasing world population usually demands for increased and efficient agricultural production. Efficient agricultural production and processing requires energy, machinery and structures of various categories. Agricultural production causes environmental degradation when cultivation is done on marginal lands, hill slopes, riverbanks, forests and water catchment areas. Human settlement introduces problem of waste management. In the attempt to sustain human population, industries have been developed. As a result, air pollution problems have been created. Chemicals used in the agricultural industry have significant impact on water quality. Kenya, like most developing countries, is already experiencing serious environmental pollution in its exploitation of soil and water resources, especially in urban and rural settlements exemplifying the ready market for Agricultural and Biosystems Engineers.

There is thus need to develop sufficient human capacity to exploit the natural resources and at the same time be capable of handling the concomitant pollution problems from a technological point of view. There is therefore need to produce engineers for the agricultural and biological sector but with a better focus (i.e. more specialized) in bio-production systems, agricultural mechanization, agricultural processing, agricultural structures engineering and soil, water and environment engineering.

Entry Requirements

1. A candidate wishing to be admitted into the B.Sc. degree programme in Agricultural and Biosystems Engineering must satisfy the minimum University entry requirements and College of Engineering and Technology regulations.

2. In addition to the above, the candidate must have obtained a minimum grade C+ (plus) in each of the following subjects: Physics, Chemistry, Mathematics, and Biology or Geography OR C+ (plus) in each of the following subjects: Physical Sciences, Biological Sciences, Mathematics, and Geography or any of the Group IV subjects at K.C.S.E. or its equivalent.

3. Alternatively, admission shall be granted to holders of Diploma in Agricultural or Mechanical Engineering or any other relevant course (with Credit and above) from Jomo Kenyatta University of Agriculture and Technology or from other institutions recognized by the University Senate. Such candidates shall enter the programme at the second year of study unless otherwise specified by the Department.
Course work

- The Bachelor of Science in Agricultural and Biosystems Engineering programme in J.K.U.A.T is a five year course with each academic year divided into two semesters.
- A student in Bachelor of Science in Agricultural and Biosystems Engineering shall, during his/her five years of study, have a minimum of sixteen (16) compulsory units in each year of study. One unit is equivalent to 45 contact hours spread over one semester of 14 teaching weeks. Two hours of tutorial or three hours of practical is equivalent to one lecture hour.
- In addition, every student is required to carry out an internal practical attachment (at the JKUAT workshops and labs) at the end of the second year of study and industrial attachments (at approved industries with systems relevant to the curriculum) at the end of the third and fourth year of study.
- In the fourth and fifth year of study, a student is required to specialize in any of the following options:
  1. Biomechanical and Processing Engineering
  2. Soil, Water and Environmental Engineering

Course Units

Year 1

Semester 1
HRD 2101 Communication Skills
SCH 2107 Physical and Inorganic Chemistry for Engineers
SMA 2170 Algebra
SMA 2177 Applied Geometry
SMA 2172 Calculus-I
SPH 2173 Physics for Engineers-I
EBE 2101 Introduction to Agricultural and Biosystems Engineering
ICS 2174 Introduction to Computer Science
SZL 2111 HIV/AIDS
HRD 2102 Development Studies and Social Ethics
EMG 2102 Engineering Drawing and Design-I
EMG 2104  Introduction to Material Science
SCH 2121  Organic Chemistry for Engineers
SPH 2174  Physics for Engineers-II
SMA 2173  Calculus-II
AHS 2101  Animal Production
HRD 2103  General Economics

Year 2
ICS 2175  Computer Programming-I
EGE 2230  Engineering Surveying
EMG 2105  Engineering Drawing and Design-II
AHS 2130  Crop Production
SMA 2270  Calculus-III
EEE 2235  Electrical Engineering-I
EMG 2203  Engineering Mechanics-Statics
EMG 2206  Engineering Thermodynamics-I

SMA 2271  Ordinary Differential Equations
SMA 2370  Calculus-IV
ICS 2276  Computer Programming-II
EMG 2106  Workshop Processes and Practice
EEE 2236  Electrical Engineering-II
EMG 2207  Engineering Mechanics-Dynamics
EMG 2302  Engineering Thermodynamics-II
EMG 2205  Fluid Mechanics-I
EBE 2201  Internal Practical Attachment

Year 3
EMG 2301  Fluid Mechanics-II
STA 2270  Statistics
EBE 2301  Soil Science
EBE 2302  Introduction to Agricultural and Construction Machinery
EBE 2303  Project Planning and Management
SMA 2371  Partial Differential Equations
EMG 2208  Mechanics of Machines-I
EMG 2303  Solid and Structural Mechanics-I

EBE 2304  Hydraulics and Pump Technology
EBE 2305  Design of Machine Elements
EMG 2304  Mechanics of Machines-II
EMG 2309  Solid and Structural Mechanics-II
EBE 2306  Irrigation and Drainage Engineering
EBE 2307  Agricultural Process Engineering
HRD 2401  Entrepreneurship Skills
EBE 2308  Engineering Hydrology

Year 4
Common Units
EBE 2401  Soil Mechanics
EMG 2414  Numerical Methods for Engineers
EMG 2204  Computer Aided Drawing and Design
EBE 2402  Remote Sensing and GIS
EBE 2403  Engineering Instrumentation
EBE 2404  Engine and Tractor Technology

Specialisations
Biomechanical & Processing Engineering Option
EBE 2405  Properties of Biological Materials
EMG 2424  Production Technology

Soil, Water & Environment Engineering Option
EBE 2406  Applied Environmental and Microbiology Ecology
EBE 2407  Irrigation System Design and Management

**Semester 2**

**Common Units**

EBE 2408  Farm Structures- Materials and Types
EBE 2409  Soil and Water Conservation
EBE 2410  Computer Modelling and Simulation
EBE 2411  Engineering Economics
EBE 2412  Structural Design
EBE 2413  Sociology, Extension and Enterprise Management

**Specialisations**

**Biomechanical & Processing Engineering Option**

EMG 2502  Heat Transfer
EBE 2414  Agricultural Field Machinery

**Soil, Water & Environment Engineering Option**

EBE 2415  Waste Water Engineering
EBE 2416  Drainage systems Design and Management
EBE 2417  External Practical Attachment-II

**Year 5**

**Common Units**

EBE 2501  Systems Engineering
EBE 2502  Environment Impact Assessment and Audit
EBE 2503  Engineering Project-I

**Specialisations**

**Biomechanical & Processing Option**

EBE 2504  Refrigeration and Air Conditioning
EBE 2505  Postharvest Technology of perennial Crops
EBE 2506  Greenhouse Design and Management
EBE 2507  Mechanization Management
EBE 2508  Pollution and Waste Management
Soil, Water & Environment Engineering Option
ECE 2302   Engineering Geology
EBE 2509   Solid Waste Management
EBE 2510   Watershed and Water Resources Engineering
EBE 2511   Aquacultural Engineering
EBE 2512   Design of Rainwater Harvesting Systems

Common Units
EBE 2513   Engineers in Society
EBE 2514   Industrial Management and Safety
EBE 2515   Engineering Project-II

Specialisations
Biomechanical & Processing Engineering Option
EBE 2516   Farm Structures-Design and Management
EBE 2517   Postharvest Technology of Perishable Crops
EBE 2518   Energy Resources Engineering
AFS 2431   Food Microbiology and Toxicology

Soil, Water & Environment Engineering Option
EBE 2519   Land Use Planning and Reclamation
EBE 2520   Design and Construction of Hydraulic Structures
EBE 2521   Air / Noise Pollution and Radiation Control
EBE 2522   Design of Soil and Water Conservation Structures