

Existing sustainable energy tertiary education system, syllabi and gaps

5th Ghana Renewable Energy Fair & National Energy Symposium
7-11, October Accra, Ghana

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10/10/2019

College of Engineering KNUST



Sustainable Energy Services Centers (SESCs)

- 2 Sustainable Energy Services Centers (SESCs) proposed to be set up for providing tertiary education services including
 - training and certification of energy services professionals
 - SE services for transformation of EEDSM market
- Pool of energy services professionals to be developed under 3 categories
 - Sustainable Energy Management Professionals (SEMP)
 - Sustainable Energy Audit Professionals (SEAP)
 - Energy Audit Practical Professionals (EAP)



SE tertiary education services in Ghana

- 3 pillars of sustainable energy - Energy Access, Renewable Energy, Energy Efficiency
- Tertiary education in Ghana
 - higher national diploma
 - vocational education
 - certificate courses
 - under-graduate & post-graduate courses - MSc, MPhil, Ph.D.



Tertiary Institutions offering SE courses

- 1. University of Ghana
- 2. Kwame Nkrumah University of Science and Technology
- 3. University of Cape Coast
- 4. University of Mines and Technology
- 5. University of Energy & Natural Resources
- 6. Koforidua Technical University
- 7. Accra Technical University
- 8. Takoradi Technical University
- 9. Sunyani Technical University
- 10. Kumasi Technical University
- 11. Ho Technical University



MSc/PhD programs in Sustainable Energy at KNUST

- PhD in Sustainable Energy Technologies
- MSc in Energy and Sustainable Management
- MSc in Renewable Energy Technologies
- Professional Masters in Energy Systems Engineering with Management



MSc Energy and Sustainable Management

- **Duration** – 12 months
 - 2 semesters of taught courses; 1 semester/4 months of thesis/project
- **YEAR 1 SEMESTER 1**
- Principles of Sustainable Management
- Energy Exploration and Production Systems
- Corporate Social Responsibility (CSR) and Sustainable Development
- Alternative and Renewable Energy Technology
- Research Methods
- Energy Markets and Trading Derivatives



MSc Energy and Sustainable Management (2)

- **YEAR 1. SEMESTER 2:**
- Innovative Financing for Sustainable Energy
- Energy Policy and Power Purchase Agreement
- Energy Economics and Investments Analysis
- Analysis of Energy Efficiency and Auditing
- Entrepreneurship and Innovations Management
- **Electives (Select 1)**
- Clean Energy Technology and Climate Change
- Advanced Sustainable Management Practices
- RESEARCH PROJECT June – August



Masters in Renewable Energy Technologies

- **Duration** - 15 months spread over three semesters
- Designed for professionals already in employment within the RE Industry
 - to enable them perform better after completion
- e-Learning programme with limited four-week residential sessions for face-to-face interaction
 - for examination, laboratory demonstrations, and the development and defence of project synopsis



Masters in Renewable Energy Technologies (2)

- **Year One (Semester One)**
- **Students select at least 2 optional (O) courses + 3 core (C) courses**
- Introduction to RE Technologies (C)
- Entrepreneurship and Business Management (C)
- Energy Policy, Gender & Planning (C)
- Liquid Biofuel Production Systems (O)
- Biogas Technology (O)
- Solar Thermal Technology (O)
- Small Hydropower Technology (O)



Masters in Renewable Energy Technologies (3)

- **Year One (Semester Two)**
- **Students select at least 2 optional (O) courses + 3 core courses**
- Research Methods (C)
- Energy & Environment (C)
- Project Analysis and Management (C)
- Solar PV Technology (O)
- Wind Power Technology (O)
- Bio-energy Technology (O)
- Hybrid Energy Systems (O)
- **Year Two (Semester One)**
- Renewable Energy Laboratory
- Research Project (C)



Professional Masters of Energy Systems Engineering with Management

- Duration – 12 months
 - 2 semesters of taught courses; 1 semester or 4 months of thesis/ project
- **Year One Semester One** - Management courses
- Quantitative Methods for Decision Making
- Accounting and Financial Management for Engineers
- Management and Organizational Behaviour
- **Year One Semester One: Energy Systems Engineering (Elective)**
- Energy Conservation Analysis
- Energy Conversion Technologies
- Energy Market and Environmental Law



Professional Masters of Energy Systems Engineering with Management (2)

- **Year One Semester Two - Management courses**
- Engineering Law and Ethics
- Project Management
- Industrial Safety Management
- **Year One Semester Two: Energy Systems Engineering (Elective)**
- Sustainable & Alternative Energy Systems
- Computer Applications for Energy Management
- Energy Policy, Economics and Technology
- **Year One Semester Three**
- Supervised Industrial Project/Thesis



Demand for sustainable energy programs - KNUST. - 2018/2019 academic year

| S/N | Programme | Number of applications | Number given admission |
|-----|--|------------------------|------------------------|
| 1 | PhD in Sustainable Energy Technologies | 10 | 6 |
| 2 | MSc in Energy and Sustainable Management | 86 | 62 |
| 3 | MSc Renewable Energy Technologies | 15 | 10 |
| 4 | Professional Masters in Energy Systems Engineering with Management | 40 | 25 |



Graduates of KNUST Energy Programmes

- Over 90% of students of KNUST postgraduate energy programs are working professionals in industries including
 - VRA, ECG, NEDCO, GRIDCO, BOST, Energy Commission
 - Facility managers of Hotels, Hospitals, Schools, Individual Private Companies



Gaps & challenges in SE tertiary education

- Inadequate laboratories & equipment/tools for hands-on practical training on energy efficiency projects, including energy audit
- Inadequate hands-on engineering design of RE projects
- Inadequate coverage of the practical aspects of promotion of sustainable energy marketing Ghana
 - Market research
 - Technology assessment
 - Energy Audits – design stage / retrofits
 - Energy & environment management system
 - Energy project development & execution – incl. engineering & procurement
 - Project financing
 - Project monitoring and evaluation



• Thank you for listening

