



**UNIVERSITY OF NAIROBI**  
**COLLEGE OF AGRICULTURE AND VETERINARY SCIENCES**  
**FACULTY OF AGRICULTURE**  
**DEPARTMENT OF PLANT SCIENCE AND CROP PROTECTION**

**STUDENTS' INFORMATION 2014/2015 ACADEMIC YEAR**

**AGRA SPONSORED PROJECT: "CAPACITY BUILDING IN PLANT BREEDING AND SEED TECHNOLOGY FOR IMPROVED FOOD AND NUTRITIONAL SECURITY IN EASTERN AFRICA"**

Agriculture is the mainstay of most African economies and directly contributes about 26% of the GDP annually and another 25% indirectly in most East African countries. The sector accounts for about 65% of total exports in Eastern Africa and provides more than 70% per cent of informal employment in the rural areas. However, food and nutritional security still remain a major challenge. Farmers mainly practice subsistence crop production using inferior quality seed of low yielding crop varieties. The region requires breeders who are responsive to farmers' needs and who have the skills to apply modern and participatory approaches to crop breeding, especially for those crops that are particularly important in Africa. The continued widespread use of farm-saved seed which, in most cases, are lower yielding, drought intolerant and less resistant to pests and disease is rampant in some parts of East Africa. The region needs to increase and upgrade skills in both plant breeding and seed systems for its personnel to be responsive to the needs of the small scale growers.

To address the above stated need, the Alliance for a Green Revolution in Africa (AGRA) awarded the University of Nairobi a 36-month project support grant to carry out the project titled "Capacity Building in Plant Breeding and Seed Technology for Improved Food and Nutritional Security in Eastern Africa".

**The goal** of the project is to contribute to food and nutrition security in Eastern Africa through increased use of high quality seed of superior crop varieties. The project will directly contribute to this goal by increasing the human capacity through enhancing knowledge and skills in participatory plant breeding, biotechnology, seed technology and seed business management for smallholder farm systems.

**The main objective** will be to enhance human capacity in plant breeding and seed technology and business for improved food and nutritional security in Eastern Africa through increased use of high quality seed of superior crop varieties.

The **specific objectives** are:

1. To train highly skilled plant breeders and seed technology specialists that can serve smallholder farmers.
2. To improve the capacity of the University of Nairobi to train MSc level plant breeders and seed technologists.

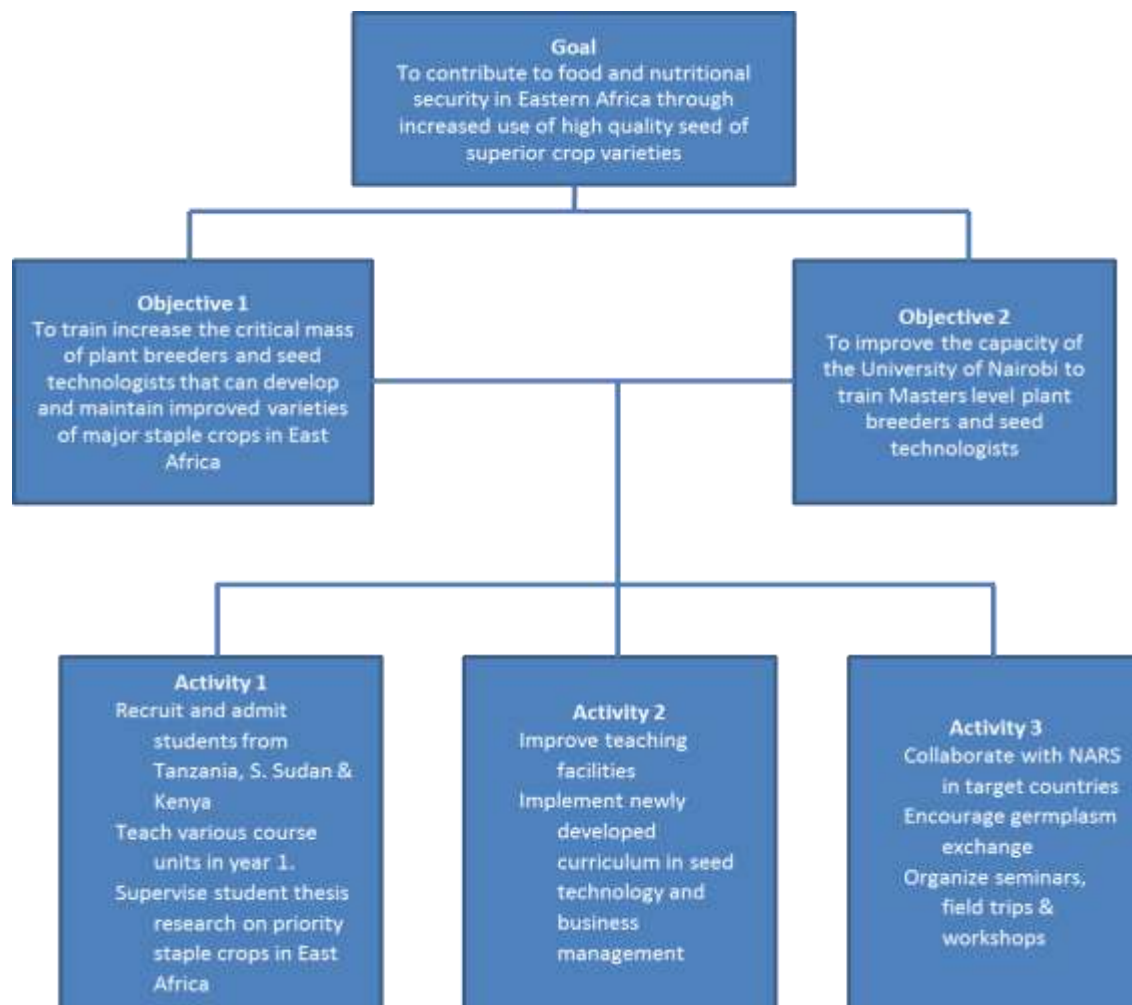
## Target Training programmes

1. MSc in Seed Technology & Business Management
2. MSc in Plant Breeding & Biotechnology

## Duration of training programmes

The two postgraduate training programmes are offered on full time basis, consisting of coursework, examinations and thesis lasting four semesters (two years). Both programs will be 2 years with the first year dedicated to course work and proposal development for the theses research and the second year to theses research attached either to the NARS, CGIAR or Seed Companies.

## Project results framework



**Main Activities:**

1. The University of Nairobi will train 12 students from Kenya (6), Tanzania (4), and South Sudan (2).
2. Students competitively selected from the major agricultural research, extension and training institutions in Tanzania, South Sudan and Kenya.
3. The trainees return to their work stations in their home countries after graduation.
4. The course work will be delivered through lectures, case studies, and practical hands on exercises by the University of Nairobi staff and practitioners from NARS, CGIARS and Seed companies to ensure relevance and therefore improve course delivery.
5. The University of Nairobi will convene a stakeholder meeting at the start of the project that includes trainers from the university and industry to discuss the implementation of the project-how they can include participatory plant breeding approaches, modern technologies and any other pertinent issues that arise.
6. The trainees will undertake individual theses research and the students will be attached to NARS, CGIAR centres and/or Seed companies for their research time and the collaborators will be involved in supervising the theses projects some of which will be carried out at their various research centres and seed companies ensuring immediate utilization of the results after completion.
7. The thesis research component of the training will target specific crops that only have 1 MSc level or no MSc student trained from their countries to work towards a situation where there are at least 2 MSc level scientists trained per crop on the major food security crops like maize, sorghum, beans, cassava, cowpea, rice, wheat, sweet potato and Irish potato.
8. Theses research will be carried out in Kenya to ensure effective supervision and access to better facilities.
9. The results of the research will be disseminated through seminars, conferences, and journal publications, pamphlets for farmers and small entrepreneurs, and farmer field schools.

**Target Research crops**

1. Kenya – Maize, rice, wheat, sweet potato, irish potato
2. Tanzania – maize, sorghum, beans, cassava, cowpeas
3. South Sudan –maize, sorghum, bean, cassava and cowpea

**Project outputs**

1. Twelve scientists trained at MSc level in Plant Breeding and Biotechnology and /or Seed Science and Technology and Business
2. The students will target their research on addressing smallholder farmer problems of crop production in the breeding and seed systems areas and when they complete will join the researchers that will develop relevant technologies in plant breeding and seed science and technology to improve crop productivity in their home countries.

**Projected Outcomes:**

1. Technologies for improved crop productivity developed through research in plant breeding and access to the knowledge and seeds increased for small farmers in Eastern Africa
2. Improved human capacity for seed systems in Eastern Africa

### Course outline for MSc in Seed Technology & Business Management

	Code	Course Title	Hours
<b>First Semester</b>			
1	ACS 600	Biometrics for Agricultural Sciences	45
2	ACP 612	Research Methods and Scientific Communication	45
3	ASB601	Seed Production Management	45
4	ASB602	Seed Harvesting, Processing and Storage	45
5	ACS 602	Crop Biotechnology and Improvement	45
6	ASB604	Economics and Marketing	45
<b>Second Semester</b>			
7	ASB603	Plant Variety Testing, Protection and Maintenance	45
8	ASB605	Seed Business Management	45
9	ASB606	Seed Quality Assurance and Certification	45
10	ASB607	Seed Legislation and Accreditation	45
11	ACS 603	Pest Management	45
12	ACP 610	Entrepreneurship in Agriculture	45
<b>Second Year</b>			
	ASB609	Thesis (equivalent to 8 units)	360
<b>TOTAL</b>			<b>900</b>

### Course outline for MSc in Plant Breeding & Biotechnology

	Code	Course title	Hours
<b>First Semester</b>			
1	ACS 600	Biometrics for Agricultural Sciences	45
2	ACP 612	Research Methods and Scientific communication	45
3	ACS 601	Advanced Plant Physiology and Metabolism	45
4	ACB 602	Biotechnology, Cytogenetics and Mutation Breeding	45
5	ACB 604	Advanced Plant Breeding	45
6	ACS 604	Seed Science and Technology	45
<b>Second Semester</b>			
7	ACB 601	Molecular Genetics and Bioinformatics	45
8	ACB 603	Biometrical Genetics	45
9	ACS 603	Crop Pest management	45
10	ACB 605	Breeding East African Crops	45
11	ACB 606	Breeding for Biotic and Abiotic Stresses	45
12	ACP 610	Entrepreneurship in Agriculture	45
<b>Second Year</b>			
	ACB 607	Thesis (equivalent to 8 units)	360
<b>Total</b>			<b>900</b>

## Semester Schedule

Timing	Duration	Task
<b>First Semester</b>		
9 <sup>th</sup> September to 6 <sup>th</sup> December 2014	13 weeks	<ul style="list-style-type: none"> <li>• Course work</li> <li>• Identification of thesis research topics</li> <li>• Development of thesis research concept notes</li> </ul>
8 <sup>th</sup> to 20 <sup>th</sup> December 2014	2 weeks	First semester examinations
21 December 2014 to 11 <sup>th</sup> January 2015	3 weeks	Christmas Break
<b>Second Semester</b>		
12 <sup>th</sup> January to 12 <sup>th</sup> April 2015	13 weeks	<ul style="list-style-type: none"> <li>• Second semester course work</li> <li>• Development of thesis research project proposals</li> <li>• Development of experimental designs</li> <li>• Identification of thesis research project study sites</li> </ul>
13 <sup>th</sup> to 25 <sup>th</sup> April 2015	2 weeks	End of second semester examinations
26 <sup>th</sup> April to 10 <sup>th</sup> May 2015	2 weeks	Finalization of thesis research proposals
<b>Second Year - Thesis Research 2015/2016</b>		
26 <sup>th</sup> April to 10 <sup>th</sup> May 2015	2 weeks	Finalization of thesis research proposals
18 <sup>th</sup> to 29 <sup>th</sup> May 2015	One day within the 2 weeks	Presentation of thesis research project proposals and allocation of theses supervisors
23 <sup>rd</sup> August to 4 <sup>th</sup> September 2015	2 week	<ul style="list-style-type: none"> <li>• Deadline for submission of approved thesis research proposals to Board of Postgraduate Studies (BPS)</li> </ul>
April 2015 to January 2016	9 months	<ul style="list-style-type: none"> <li>• Carrying of research project studies/ experiments (2 seasons)</li> <li>• Data collection, entry and analysis</li> <li>• Finalization of first 3 chapters (introduction, literature review, materials &amp; methods) of thesis</li> <li>• Data interpretation</li> </ul>
January to April 2016	3 months	Compiling of the thesis and evaluation by supervisors
April to May 2016	2 months	Approval and submission of MSc thesis to BPS for examination
July to August 2016	2 months	<ul style="list-style-type: none"> <li>• Oral defense of the MSc thesis</li> <li>• Resubmission of the approved thesis to BPS for award of Degree</li> </ul>

## Summary Time Lines for the Two Year MSc Programme

Activity	2014				2015												2016									
	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	
Course work – Semester 1	█	█	█	█																						
Course work – Semester 2					█	█	█	█	█																	
Development of thesis proposal		█	█	█	█	█	█	█	█	█	█	█														
Present research proposal at departmental seminar & allocation of supervisors									█																	
Initiate research – Set up of experiments					█	█	█	█	█	█	█	█														
Data collection, entry and analysis – Long rains 2015							█	█	█	█	█	█														
Submission of approved thesis research proposals to BPS												█	█	█												
Data collection, entry and analysis – Short rains 2015													█	█	█	█	█	█								
Compile first 3 chapters of thesis (introduction, literature review and methodology)				█	█	█	█	█	█	█	█	█	█	█	█	█										
Complete experiments																	█	█	█	█	█					
Data interpretation – write results chapter																	█	█	█	█	█	█				
Compile and complete thesis and thesis evaluation by supervisors																		█	█	█	█	█				
Thesis Progress report Seminars																		█								
Thesis submission to BPS																										
Thesis examination																										
Thesis oral defense																										
Graduation																										█

**NB:** Students are advised to consult their thesis research supervisors on a continuous basis; modality and logistics of the consultations should be agreed with the respective supervisors

### Steps to Proposal Development

1. Identify a research topic (area of interest, or guided by an academic member of staff, or join an on-going research project by an academic member of staff). It is always advantageous to join funded research projects since this may help defray some of thesis research project costs. Alternatively, one may chose a research topic leaning towards the needs of the students' employer – for example:
  - 1.1. Collect data during agricultural extension work (surveys & sample collection) and set up experiments at the nearest Agricultural Training Centres or farmers fields for students employed by the ministry of agriculture.
  - 1.2. Experiment set up on the farm, or use existing experiments or research projects for students employed in horticultural industry.
2. Discuss the topic with potential academic supervisor
3. Develop a concept note (2-5 pages). Components of a concept note are:
  - 3.1. Title
  - 3.2. Introduction
    - 3.2.1. Background
    - 3.2.2. Problem statement

- 3.2.3. Objectives (2-3 objectives)
- 3.3. Proposed methodology – outline procedures of achieving each of the objectives stated in 3.2.3 (one paragraph for each objective).
- 3.4. Expected outputs (or results)
- 3.5. Budget (cost of implementing the project)
- 3.6. Proposed work plan – time lines to implementation of each of the activities involved in the thesis project (from proposal development to thesis submission – *see Gant chart given above*)
4. Develop the full proposal after satisfactory evaluation of the concept note by the academic supervisor. Outline of the full proposal format may be as follows:
- 4.1. Title (statement that summarizes the whole document – 1-2 lines long)
- 4.2. Introduction (2-3 pages long)
- 4.2.1. Background (general information about the topic of research)
- 4.2.2. Problem statement (problems or constraints; why the need to carry out research or what are the knowledge gaps in the subject)
- 4.2.3. Objectives (state the broad objective and 2-3 specific objectives)
- 4.2.4. Hypothesis to be tested (one hypothesis for each of the specific objectives)
- 4.3. Literature review – maximum 10 pages. The literature review describes what is known about the area of proposed research. This section should have a number of sub-headings which should ideally address all the aspects to be addressed in the experiments. The information given in the literature review is mainly derived from published work – journal papers and books but must avoid copy & paste. Obtain information from the references, synthesize and write in own words. All information given must be referenced and up-to-date references are highly encouraged (references of up to the present year).
- 4.4. Materials and methods – maximum 5 pages. The materials and methods describes the procedures and experiments to be carried out during the study. This section should have sub-headings, each of which describes the procedures to be followed in the experiments, experiment specifications, experimental design, replications, experimental layout, data to be collected, sampling procedures, and statistical data analysis. Each of the objectives stated in section 4.2.3 must have corresponding experiment(s) in the materials and methods.
- 4.5. Expected outputs (or results) – maximum 1-2 paragraphs. This section describes the results to be obtained from the study.
- 4.6. References – list of all the references cited in the document.  
The standard format of citing references must be followed.

**Author(s). Year. Title of paper. Journal, volume: pages**

Examples are given below:

**Journal :** Starr, M. P. 1984. Landmarks in the development of phytobacteriology. *Annual Review of Phytopathology* 22: 169–188.

**Book:** Schaad, N. W. (ed.) 1980. *Laboratory Guide of Identification of Plant Pathogenic Bacteria*. APS Press, St. Paul, MN.

**Chapter in a book:** Otim-Nape GW, Thresh JM, Fargette D. 1996. *Bemisia tabaci* and cassava mosaic virus disease in Africa, p. 319-350. In: Gerling D, Mayer RT (Eds.). *Bemisia* 1995: Taxonomy, Biology, Damage, Control and Management. Intercept, Andover, UK.

**Internet source:** Gottwald, T. R. 2007. *Citrus Huanglongbing: the pathogen and its impact*. APSnet feature. <http://www.apsnet.org/online/feature/huanglongbing/>. Accessed 20<sup>th</sup> January 2010.

**Article in a newspaper:** Warrick, Joby. "Lawmakers Urge Special Counsel Probe of Harsh Interrogation Tactics." *Daily Nation* 25<sup>th</sup> July 2015, Upcountry edition.

**Report by an institution:**

- Food and Agriculture Organization (FAO). 1997. Worldwide regulations for mycotoxins for 1995: A compendium. Food and Nutrition Paper No. 64. FAO Rome.

- Kenya National Bureau of statistics. 2007. Economic Survey report: Ministry of Planning and National Development. Pp 159-179.
- Ministry of Agriculture, 2006. Eastern province annual crop report. Ministry of Agriculture, Nairobi, Kenya.

**Proceedings:** Legesse, B.W., Myburg, A.A., Pixley, K., Twumasi-Afriyie, S. and Botha, A.M. 2007. Genetic diversity of maize inbred lines revealed by AFLP markers. *African Crop Science Conference proceedings* 8:649 - 654.

**Proceedings:** Howler RH, Oates G, Allem A. 2001. An assessment of the impact of cassava production on the environment and biodiversity, p. 3-9. *In: Hershey, C (Ed.). Proceedings of Validation Forum on Global Cassava Development Strategy held from 26<sup>th</sup> to 28<sup>th</sup> April 2001, Rome, Italy.*

**Thesis:** Njenga, L. N. 2008. Fungal and aflatoxin contamination in maize from eastern Kenya and evaluation of possible management strategies. MSc. Agricultural Resource Management, University of Nairobi

4.7. Work plan – Use a Gant chart

4.8. Budget

### Sources of Information in proposal Development and Thesis Write up:

1. University of Nairobi online library – University of Nairobi registered students can access full length journal papers in major data bases (AGORA, AJAOL etc) by logging into the UoN library using computers in the library or in computer laboratories.
2. University of Nairobi libraries – Kabete, Chiromo and others for past theses on related topics
3. Research institutional libraries – KARI regional research centres, KARI headquarters, ILRI (Nairobi), ICRAF, CABI.
4. Government ministries – Ministry of agriculture libraries and annual reports and other publications, Agricultural Information and Resource Centre (at Kabete NARL).
5. Data bases – AGORA, CABI data bases,
6. Internet websites – google search engine;

### Examination Regulations for MSc Degree Programme

#### Written examinations

1. Each course shall be examined by a written paper lasting three hours at the end of each semester in which the course is given.
2. The coursework assessment shall account for 30% and written examinations for 70% of the final mark.
3. The pass mark for each course shall be 50 %.
4. The grading of the courses shall be as follows:  
A = 70% and above; B = 60 – 69%; C = 50 -59%; D = 0 – 49% (fail)
5. A candidate who fails in any paper may, on the recommendation of the Board of Examiners, and approval by the Senate be allowed to take up to two supplementaries in failed papers after paying the appropriate fees.
6. A candidate who fails in the second supplementary or fails to complete the programme in the prescribed maximum duration of 8 semesters shall, on the recommendation of the Board of Examiners and approval by the Senate, be discontinued.
7. The mark for a supplementary paper shall be recorded as 50% in the candidate's academic record.

#### Thesis examination

In consultation with their supervisors, candidates will choose a topic from the field of study for their research. Before embarking on research, the students will be required to prepare a proposal which will be approved by the department. At the end of the research, they will write a thesis, present a summary of research findings and submit a thesis for examination. The following are the guidelines for thesis examination:

1. Each student shall present a seminar on the thesis research proposal.



2. Each candidate shall submit for examination a thesis, with the approval of the academic supervisors, at the end of the final semester. The thesis shall be examined in accordance with the common regulations of the University of Nairobi.
3. A candidate who fails in the thesis examination may on the recommendation of the Faculty Board of examiners be allowed to resubmit the thesis within six months up to a maximum of two times.
4. A candidate who fails after the second resubmission or fails to complete the course in the prescribed period shall, on the recommendation of the Faculty Board and approval by Senate, be discontinued.