MODULES DESCRIPTION FOR MEAT SCIENCE AND TECHNOLOGY

1. Module Presentation

Module Code: FST3122	**School**: Agriculture and Food Science (SAFS)
Module Title: Meat Science and Technology	**Year**: **Semester: 1 Credits**: 10
First year of presentation:2009	**Administering School:** SAFS
Pre-requisite or co-requisite modules, excluded combinations: **Pre-requisites**: Biology, Chemistry and Food Chemistry. **Co-requisites**: None	

2. Allocation of study and teaching hours

Total student hours 150	**Student hours**
Lectures	35
Seminars/workshops	10
Practical classes/laboratory/filed visits	30
Structured exercises/tutorials	15
Set reading	10
Self-directed study	25
Assignments – preparation and writing	15
Examination – revision and attendance	10
TOTAL:	150

3. Brief description of aims and content

This module aims to enable students to develop abroad and in depth knowledge, skills and expertise on the following points: Animal slaughter and slaughtering techniques; Inspection, cutting and grading of meat; Analysis of meat and meat products; Meat preservation techniques; Microbiology and spoilage of meat and meat products; Production and handling of poultry products; Microbiology and spoilage of fish and fish products; Fish science and technology. The principles of meat processing, meat pigments, flavor and color change.

4. Intended Learning Outcomes

A. Knowledge and Understanding

Having successfully completed the module, students should be able to demonstrate knowledge and understanding of:

A.1. The structure of muscle and associated tissues;

A.2. Chemical composition of meat;

A.3. Mechanism of muscle contraction;

A.4. Post-mortem changes of muscles;

A.5. Effects of meat preparation, processing and preservation on meat safety and quality.

B. Cognitive/Intellectual skills/Application of Knowledge

Having successfully completed the module, students should be able to:

B.1. Apply Meat Science and Technology analysis to problems of meat inspection and hygiene;

B.2. Apply the principles of meat preservation and adding value for nutritional quality improvement and income generation;

B.3. Apply knowledge for meat processing and preservation to solve nutritional problems;

B.4. Conduct animal slaughtering and inspection.

B.5. Assess the safety and quality of meat and fish products.

C. Communication/ICT/Numeracy/Analytic Techniques/Practical Skills

Having successfully completed the module, students should be able to:

C.1. Conduct laboratory tests and meat inspection for detection and identification of chemical and microbial hazards in meat and meat products;

C.2. Search various online databases containing information on various hazards in meat/fish and meat/fish products

D. General transferable skills

Having successfully completed the module, students should be able to:

D.1. Conceptualize the different international regulations on meat cutting and grading systems;

D.2. Apply the concepts of meat processing and preservation in ensuring quality along the meat value chain.

5. Indicative content

Component I: Principles of meat science and technology

- **Basic Science of Meat:** Description and types of muscles; Structure of muscles; Mechanism of muscle contraction; Chemical composition of meat; Quality characteristics and nutritional value of meat.
- **Animal Slaughter and slaughtering techniques:** Slaughtering plant location and facilities, animal slaughtering techniques, animal slaughtering by products,
- **Inspection, cutting and grading of meat:** Meat inspection, Ante-mortem inspection, Post-mortem inspection, Consequences of meat Inspection, Carcass grading (beef, pork, poultry), Meat deboning.
- **Post-mortem changes of muscles:** Muscle Metabolism, Post-mortem Changes in Muscle, Biochemical Alterations, Physical Alterations, Unusual Patterns of Postmortem Metabolism, Meat tenderness, Factors affecting the tenderness of the meat; Meat Tenderization Techniques.
- **Color and flavor of meat:** The nature of color, Meat pigments; The chemistry of myglobin colour;The fundamentals of raw meat colour; Meat Color From Slaughter to Display; Applied aspects of colour in meat; Fat colour, Flavour of meat and meat products

Component II: Meat products processing

- **Approximate Analysis of meat and meat products:** Sample preparation, Moisture analysis; Protein determination; Fat content determination; Ash, carbohydrate and vitamins determination, Cholesterol determination.
- **Meat preservation techniques:** Meat curing technology; Meat smoking technology; Meat canning technology; Refrigeration and freezing methods; Irradiation, Freeze drying, High pressure treatment, Fermentation
- **Meat and meat products:** Sausages making, Fresh sausages, Cured sausages, Fermented sausages, Cooked and uncooked sausages, Luncheon meats, Hams,

Bacon, Cooked refrigerated meats, Dry-preserved meats, Cured meats; Canned meats; Frozen meats.

- **Spices and flavorings of meat and meat products:** Spice blends, Spice usage in foods, Industrial spices and herbs, Use of spices in meats, Basic meat blends, Commonly used spices in meat
- **Microbiology and spoilage of meat/fish and meat/fish products:** Microbiology of primary processing. Spoilage of fresh meats; Spoilage of fresh fish;
- **Production and handling of poultry products:** Anatomy and characteristics of the egg; Chemical composition of egg; Recommended Handling of eggs; Storage & egg preservation; Egg quality evaluation; Storage and sale of Eggs.

Component III: Fish and seafood technology

Classification of fish/seafood; Structure and composition of fish/seafood; Nutrient/ chemical composition of fresh fish/seafood; Principal constituents (percentage) of fish/seafood; Postmortem changes in fish/seafood and nature of spoilage; Fish/ seafood handling and preparation; Fish /seafood processing and preservation; Quality assessment of fish and fish/seafood products.

6. Learning and Teaching Strategy

The course is delivered through lectures, tutorial sessions, laboratory experiments and food processing activities. The lecture includes interactive elements whereby students in groups apply principles to simple problems to ensure their involvement and so gain understanding. Handouts are used so that students can concentrate on the material of the lecture, but with gaps where students either have to fill in or make separate notes.

The laboratory experiment and assignments will require the students to undertake some investigation on their own and to develop ideas and apply them. The students will also produce a report for each given case of study.

The course will also be delivered through blended learning methods, where the students will learn theories and practices without necessary being in direct contact/face to face with lecturers. The online teaching system will also be one of the teaching systems of the module. Where it is necessary, essential content will be presented through short video clips, offering structured, detailed explanations to better serve students learning on their own. The students are trained and requested to use the UR E-learning platform. They are also facilitated to access the good quality journals including journals of food science and related discipline online. The course materials will be provided via moodle platform.

7. Assessment Strategy

The knowledge and application skills will be assessed though continuous assessments tests: Class written tests, quizzes, written and oral presentations of individual and group assignments, laboratory experiments and study visit reports. The students will therefore not just rely on memory but also show understandings of principles and application of the class learn procedures and techniques. In addition to the feedback get during tutorials and on their assignments, the students will complete at least one formative test using e-learning assessment strategy. Their final assessment will be based on an individual, written exam.

8. Assessment Pattern

Learning Unit	**Weighting (%)**	**Graduate Attributes & Learning outcomes to be**
Practical, assignment and filed visit reports and presentation	30	A1-C2
Continuous assessment test	20	A1-C2
Written Final exam	50	A1-D15

9. Strategy for feedback and student support during module

- Interactive lecturing style, with opportunities for questions, and requirement to work on simple problems;
- Peer marking of tutorial questions for formative feedback;
- Tutorial classes where students can ask questions and be lead through solutions as required;
- Marked summative assessments (laboratory report and assignments) handed back to students, with comments;
- Opportunities to consult lecturers and/or tutorial assistant in office hours. At least on day per week will be reserved for student's guidance per lecturer;
- Giving feedback to students through online system, UR E-learning platform will be used.

10. Indicative Resources

Core Texts

Hui Y H and associates (2012) " Handbook of **meat** and **meat** processing"- Meat Science and Technology,. Technology of Aquatic Resources—Volumes 1

Background texts

- Wongo L.E. (2003): "Laboratory Manual in Food Science and Technology", Department of Food Science and Technology, JKUAT, Nairobi, Kenya.
- Hui, Y. H. , E. Özgül Evra (2012) "Handbook of Animal-Based Fermented Food and Beverage Technology, New York, CRC Press, Taylor & Francis Group.
- Nollet LML Boylston Coggins, Gloria MB (2012) "Handbook of **meat**, poultry and seafood quality". New Jersey, John Wiley & Sons Press.
- Paul D. Warriss (2009) Meat Science: An Introductory Text. London, CABI Publishing.
- Chen Q, Anders S, H An (2013) "Food Quality and Preference-Measuring consumer resistance to a new food **technology**: A choice experiment in **meat** packaging. Elsevier, Volume 28, pp. 419-428

Key Journals:

- International Journal of Meat Science
- Scientific journal 'Meat Technology'
- Fleischwirtschaft international: journal for meat production and meat processing.
- International Journal of Meat Science Meat Technology"
- Meat Science - Journal – Elsevier
- Journal of Fisheries and Aquatic Sciences
- Fisheries and Aquatic Sciences - Springer

11. Module Teaching Team

Module leader: Dr. Eugene NIYONZIMA, Mr. Jean Paul HATEGEKIMANA