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**HOPE COLLEGE  
OF  
BUSINESS, SCIENCE and TECHNOLOGY  
Faculty of Science and Technology**

**Department of Food Science and Technology (B.Sc.)  
Revised Curriculum**

**December, 2015**

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# 1. INTRODUCTION

## 1.1. Background

The department of food science and technology of Hope College has been operational since September 2012. The department has been training students in the area of food science and technology at B.Sc. level. Since its establishment, the department has made lots of improvements in its teaching and learning process, facilities, laboratories and library to ensure the high quality of the program and go in line with similar local and international Universities offering Food Science and Technology. Although the department is in its infancy, it has now well-equipped laboratories and professional staff members.

As a vibrant institute that envisions generating ‘leaders for a world of hope’, Hope College shall produce graduates in food science and technology who will find attractive career opportunities in the food processing firms, relevant government agencies and educational institutions in Ethiopia. Furthermore, positions are available to food science and technology graduates in the areas of product development, quality assurance, food systems management, and food research, food technology, and marketing and sales with a relatively fast growing food industry in Ethiopia opening a vista of opportunity for employment. Since the food industry in Ethiopia is also growing fast, it requires qualified personnel to develop the means to process, preserve, package, store and deliver nutritious, convenient and safe foods.

Food science and technology is the study of the physical, chemical, and biological properties of foods, in addition to the factors affecting them and their ultimate effects upon the sensory, nutritional, and storage properties and the safety of foods. It is the scientific understanding of the composition of food under various conditions and the means or activity by which food product is changed. It entails multidisciplinary subjects involving a combination of several sciences and a knowledge of the composition of food materials and their physical, biological and biochemical behavior including:

- interaction of food components with each other and/or with other elements or materials (e.g. oxygen, packaging materials)
- nutrition
- enzymology
- microbiology
- toxicology
- effects of manufacturing, processing and storage.

Even though the department has not yet graduated its first batch of students, the College and the department has taken their own initiative to revise the food science curriculum by hiring renowned food science consultants locally so as to improve and

incorporate the lessons learned during the last three years. At the same time, the revised curriculum can be used as part of the HERQA's assessment for re-accrediting the program for the coming years.

## **1.2. Rationale**

A cursory need assessment survey was conducted by the Committee formed to develop the program in Food Science and Technology. The survey revealed that the manpower need of the country in the field of Food Science at graduate level is high. Based on the needs assessment that focused on representative Central Government Institutions, Regional Governments, Private Companies and even international organizations working in nutrition, it became clear that the country is facing a shortage of manpower trained in Food Science and Technology at all levels in order to complement the Government's and Private-Public organizations' efforts in Food Security Strategy of the country. The major finding of the survey has been there are many Governmental organizations that offer similar training in country but it is only HOPE College who has taken the initiative to start Food science and technology related department for the first time in the Country. Hope College strongly believes that the demand for qualified personnel in the country can't only be met by the government institutions but also with the involvement of private institutes.

It is obvious that in Ethiopia the estimated yearly production of food materials and food products is significantly low to feed the growing population of the country. Though, a remarkable increase rate is recorded in recent years in food products, it is below the increasing per-capita food need of the country.

The food industry which originally provided only primary products for final preparation in home, has found itself responding to market demands for more refined, sophisticated, and convenient products. The demand for easy to prepare convenience foods, poses major scientific and technological challenges which cannot be met without highly trained scientists capable of understanding the complex chemistry/biochemistry of food systems and knowledge of how to preserve them. The increased tendency of society on ready-to-eat foods has led to greater responsibility for processors in terms of quality, safety and nutritional value.

Thus, the current need for Food Science experts at various central and regional government institutions and organizations in the country can be considered highly significant. This can be expected to triple in five years and quadruple in ten years as the economic liberalization is exploited.

It is also important to note that the Government is seriously taking Food Security problems while pushing ahead with plans for economic development. Thus, the contribution of the Food science and technology is crucial and in line with the Government's plan. In this regard, the role of HOPE College in continuing the food science and technology program is immense.

## **1.3. Department Vision and Objectives**

### **1.3.1. Vision**

To offer cutting edge education in the field of food science, food technology and related subjects, excelling in teaching and external engagement thereby contributing to sustainable development in Ethiopia.

### **1.3.2. Objectives**

#### **1.3.2.1. General Objective**

The general objective of Food Science and Technology Program is to implement education and outreach programs designed to provide a safe, nutritious, and affordable food supply that promotes human health.

#### **1.3.2.2. Specific objectives**

1. To continuously provide conducive environment of learning for staff and students in food science and Technology
2. To make teaching, learning and assessment practice favorable through revision of curriculum to meet market needs
3. To promote outreach initiatives that results in Hope College-industry collaborations on a sound footing
4. To enhance excellence in administration and quality management of the food industry in Ethiopia
5. To organize, develop and regulate the technological profession, based on sound professional practices in the field of Food Science and Technology.
6. To produce graduates with high caliber to serve the market needs, with high sense of responsibilities to themselves and to the society.
7. To broaden the understanding and thinking of our graduates in food science and technology so much so that a culture of entrepreneurial initiative shall be inculcated in their minds thereby developing their capability of producing food products that meet national and international standards.
8. To provide holistic development of students through our mix of course offerings thereby producing competent, mature, independent, self-motivated critical thinkers with a good sense of work ethic thus contributing positively to the workplace and the community at large

## 2. GRADUATE PROFILE

### 2.1. General Profile

All HOPE COLLEGE graduates shall exhibit the following profiles:

- **Integrity and Personal Accountability:** appreciating and internalizing high integrity and taking responsibility for one's actions at work and in society.
- **Self-regulation:** instilling attitudes for self-development through lifetime learning, initiative taking and self-correction.
- **Intellectuality:** working scientifically, using analytical skills, to develop and carry out research that is valuable to the country's needs and development, writing and presenting one's findings in clear and coherent manner and by so doing contributing to knowledge.
- **Competence:** capacity to apply the knowledge ascertained and adds value in one's role in organizations.
- **Leadership:** playing a leading role in organizations and making a difference with team work, respect of people, exceptional integrity, motivation and commitment.

### 2.2. Professional Profile

- 2.2.1. The capacity to utilize critical thinking and quantitative skills in food Science and Technology and related sciences and apply them to solve practical problems.
- 2.2.2. The professional capacity to analyze the structure and composition of food and the changes that occur during processing and storage
- 2.2.3 The capability for fundamental and integrated knowledge in Food Science and Technology which they can apply to challenges associated with food safety, quality and processing
- 2.2.4 The capacity for effective oral and written communication skills that facilitate individual and team interaction
- 2.2.5 The professional capacity to recognize the entrepreneurial opportunities in the relatively expanding Food Industry in Ethiopia and thereby augment the country's progress towards industrialization
- 2.2.6 The ability to use techniques, tools and skills and technologies that are necessary and useful for the food industry
- 2.2.7 The professional capacity and ingenuity to plan and develop new food products, as well as providing advisory services to those pursuing a career of catering, or managing the business aspects of food service.

### **3. TEACHING PHILOSOPHY AND METHODOLOGY**

#### **3.1 Teaching Philosophy**

Based on the mission of HOPE COLLEGE and the outcomes of the discussions with relevant stakeholders, the following elements constitute the philosophy of the curriculum:

- Excellence in applying scientific knowledge in a professional setting.
- Continual interaction between the faculty, students and professional learning environments to boost competence.
- Integration of theory and practice to bring about excellent professionals.
- Ongoing contact with the private and public sectors and other stakeholders to develop a curriculum that is relevant, competitive and value adding.
- The development of competencies as an indispensable outcomes of the curriculum.
- The reinforcement of teaching with coaching to effectuate holistic student development.

#### **3.2 Teaching Methodology**

Competency based education which is a student-centred methodology emphasizing theory; skills, attitudinal; change and professional development will be exercised. In this interaction, there shall be class room lectures, laboratory activities, and practical exercises in the private sector. Students will also engage in presentations, group projects, which reflect actual situations in business or industry.

Competency based education stresses the interrelationship of several learning dimensions in which the students combine knowledge, skills, motivation and attitude to create effective learning processes and to meet the standards of Hope College.

The educational program will be characterized by increasing complexity. Knowledge, skills, attitude and competencies will be tested at several levels during all semesters. The following four complexity-dimensions are distinguished:

- Level of self management of the student
- Level of professional development to be attained
- The level of knowledge (and required analytical skills) to understand a specific subject
- The number of instruments, tools and methods needed to approach the subject

The department acknowledges these dimensions and challenges the students in their process towards professional maturity. Therefore, the curriculum has the integrative elements between theory and practice, between the different disciplines that are taught (a multi-disciplinary approach), and between the constituting parts of a competency. Furthermore, the curriculum has integrative elements among language, quantitative courses, analytic, synthetic, scientific, technical and ethical tools to explore available knowledge and develop an intellectual maturity for better judgement, leadership and knowledge ability.

## 4. ASSESSMENT METHODS

### 4.1 Student Assessment

Quality assurance is not just about knowledge. It is also about competence. There will be cognitive examination in each course in which the knowledge is tested. But there are also several assessments where students perform to show their competencies. Methods of quality assurance will include both formative and summative evaluations:

Formative evaluations through

- Tests
- Project work
- Term papers
- Field reports
- Laboratory exercises/experiments
- Internships
- Exams

Summative evaluations through:

- \*Student and staff evaluations,
- \*Record of student achievements,
- \*External assessors.

#### 4.1.1. The Grading System

The grading system is a five scale assessment ranging from A to F as presented below.

|       |                |         |                |                |         |                |                |         |                |                |          |                |         |
|-------|----------------|---------|----------------|----------------|---------|----------------|----------------|---------|----------------|----------------|----------|----------------|---------|
| Score | [86,100]       | [80,86) | [76,80)        | [70,76)        | [66,70) | [60,66)        | [50,60)        | [47,50) | [37,47)        | Below<br>37    | [86,100] | [80,86)        | [76,80) |
| Grade | A <sup>+</sup> | A       | A <sup>-</sup> | B <sup>+</sup> | B       | B <sup>-</sup> | C <sup>+</sup> | C       | C <sup>-</sup> | D <sup>+</sup> | D        | D <sup>-</sup> | F       |
| Value | 4.00           | 4.00    | 3.75           | 3.50           | 3.00    | 2.75           | 2.50           | 2.00    | 1.75           | 1.50           | 1.00     | 0.75           | 0.00    |

### 4.2 Program Assessment and Development

To guarantee the quality and standard of the program, the Department:

- Provides on-the-job training upgrading the academic qualification of the staff as needed.
- Gathers feedback from students, employers and graduates as deemed necessary and uses the feedback to improve the curriculum.
- Has prepared and has in place rules governing delivery and assessment of courses.
- Performs regular evaluation of the program based on the current trends in the field and the country's skilled manpower need
- Periodically acquires appropriate textbooks/references, laboratory equipment, software applications, and so forth.



- Prepares a course syllabus for all courses offered in the department in order to standardize the course content.
- Carries out regular evaluation of the staff
- Undertakes regular evaluation of the program vis-a-vis the need of the country for skilled manpower in that particular field of study.
- Evaluates the performance of its graduates in the world of work. Textbooks/references, laboratory equipment, software applications, and so forth.
- Organizes program evaluation workshop in the presence of the staff, alumni, students, employers, external assessors, sponsors, donors, policy makers and other stakeholders.

## 5. ADMISSION REQUIREMENTS OF THE DEPARTMENT

A candidate will be eligible for admission if he/she fulfills the minimum admission requirement set forth by the Ministry of Education for the year and shows passion for learning and determination to take advantage of the academic opportunities at the College as stipulated in the charter. A candidate will be eligible for admission if he/she fulfills the minimum admission requirement

- ✓ Set by the Ministry of Education for the year
- ✓ Advance standing
- ✓ Transfer from an accredited higher institution for degree program
- ✓ TVET graduates who are certified by COC agency, have two years of service and entrance examination of the College

## 6. DURATION OF THE STUDY

The duration of the study for the Bachelor of Science (BSc) in Food Science and Technology is four years.

## 7. DEGREE NOMENCLATURE

The degree offered after successful completion of the program is called:

In English – “Degree of Bachelor of Science (BSc) in Food Science and Technology”

In Amharic – “ጥገና ስነ ምግብና ቴክኖሎጂ ባህሪ ስነ ምግብና ቴክኖሎጂ”

## 8. GRADUATION REQUIREMENTS

Graduating students shall be awarded the “Bachelor of Science in Food Science and Technology” if they fulfill the following requirements:

- An attainment of a minimum of 144 credit hours
- An attainment of a minimum Cumulative Grade Point Average of 2.00
- An absence of F, NG, and I in any course grading.

## 9. COURSE CODING

Course Code used has a four-letter prefix and a three-digit number.

The prefix which represents the department is assigned to all core courses in the department. If a core course is the responsibility of another department, it will be assigned a different code by a receiving department, but both codes will be shown on the course description to indicate that they are actually identical. For cross-cutting courses the prefix indicates the subject area, and the responsible department is indicated only in the course description.

- The first digit represents the year in which the course is offered (year at college starts with 2).
- The second digit indicates the courses that are offered in the same semester by the department in sequential order (ranging from 1- 6). For cross-cutting courses, the number is 0.
- The third digit represents the semester in which the course is offered. All first semester courses take number one and second semester courses take number two

## 10. QUALITY ASSURANCE

The college shall have a section for Quality Assurance as an internal audit of the academic program. The director of this section shall ensure quality by monitoring and evaluating academic programs and achievements on a regular basis using set benchmarks of academic excellence.

10.1 The internal scheme of performance audit shall enable constant renewal and relevance in the college. The audit would review the actual outcomes of the content and pedagogy of disciplines by departments, courses, programs and also student competencies.

10.2 Though the established goals, objectives and desired outcomes of the college would be important benchmarks of the audit, the evaluation efforts, being focused on value adding features, may point to the revisiting of certain objectives and activities of the curriculum.

10.3 In this way, the college will be made aware of what it needs to change and make the necessary adjustments to stay abreast of the latest developments of knowledge. In the end, the curriculum is intended to develop graduates who demonstrate proficiency in general knowledge, communication, critical thinking, contextual competence, aesthetic sensibility, professional identity and ethics, leadership capacity, scholarly concern for improvement and motivation for continuing learning.

10.4 The curriculum anticipates a qualitative change in the mental and spiritual capacities of students. In this regard, every attempt will be made to transform the capacities of students to a level that would make them change makers. The evaluation will track these outcomes and assess the qualitative changes gained in each student.

10.5 Considering the danger of internal evaluation from the standpoint of inbreeding and defensive pretensions by all concerned, internal evaluations will be counterbalanced by external ones. These would be openly discussed for subsequent adjustments.

The department shall do a review of the program after four years of implementing this curriculum by collecting feedback from employers and graduates of the program. This review will help to maintain the quality of the program in line with the demand of the employers and the country at large. Methods of quality assurance of the program will include but not be limited to:

- Comprehensive exit examinations and colleague assessment of examination papers and teaching methods;
- Periodic workshops (with stakeholders, teachers and graduates);
- Assessments by using survey project works (research), internships, and link programs;
- Graduates' evaluation of the program, establishing a Graduate Alumni organization as a mechanism to implement such evaluations and follow their career paths;
- Standardization of course offerings through preparation of general course outlines, exam contents, and external audit;
- Annual assessment of the program by the teaching staff;
- Working closely with the relevant professional associations to assess graduates' performance.

## **11. RESOURCE REQUIREMENTS**

### 11.1 Teaching Staff

To the extent that the quality of education to be provided is primarily dependent on the skill and excellence of its staff members, Hope College shall engage outstanding faculty members from within country and abroad in teaching.

### 11.2 ICT Laboratory

HOPE COLLEGE shall avail adequate computer terminals for students and faculty to enable on line learning and reading, share knowledge and experiences and work with various software that contribute to one's professional development. In such laboratory, one shall also get assistance in digital connections and system's use.

### 11.3 Laboratory Facilities

Food Science and Technology requires laboratories in basic physics, chemistry and biology. In addition, more advanced capabilities are needed in Biochemistry, Organic Chemistry, Microbiology, Food Chemistry, Food Analysis and Food processing.

To service such a broad range of laboratories, our laboratory equipment is built around a common system maximizing the use of digital equipment, probes and sensors. Medical and industrial laboratories are using digital methods now for many measurements. Digital equipment is flexible in use and easy to move setup and disassemble. Use of this equipment will be cost effective because the laboratories can share the equipment when needed. The current physics lab has been operating with digital sensors and laptop computers and that has proven to be effective at teaching lab skills as well as giving the students the ability to analyze digital data. Some of the key items included are:

- ◆ Digital microscopes where the images are viewed on a computer screen
- ◆ Kjeldah protein analyzer
- ◆ Soxhlet Fat Analyzer
- ◆ Oven moisture analyzer
- ◆ Crude fiber analyzer
- ◆ Muffle Ash determiner
- ◆ Sensors for pressure, temperature, salinity, voltage, pH and conductivity

The laboratory complex for the Faculty of Science and Technology consisted of three laboratories, one each for experiments based in physics, chemistry and biology. These laboratories are using a common set of digital equipment. For teaching purposes, experiments are normally setup for an experiment and then taken down until needed again. All laboratories will have computer network access. The chemistry and biology laboratories as well as Food microbiology, Food Analysis and processing laboratories will have water and sinks and fume hood or bio-safety cabinets.

The experiments that students perform include an internationally recognized set of experiments that will enable the graduates of the department to tackle problems that might be waiting in the forthcoming realm of the industry settings or solving problems in the situations of the current food safety and quality in the country. More advanced equipment, including the digital microscopes, atomic absorption spectrometer and precise melting point determination device, will be available for organic chemistry, biochemistry and microbiology in the near future.

Moreover, the college is collaborating with Addis Ababa University Centre for Food Science and Nutrition for more advance instruments such as HPLC, GC and AAS and engaging students for practical experience at Ethiopian Public Health Institute during their Internship period.

#### **11.4 Library Facilities**

Students will have access to a spacious and well stocked library. Computers will be available in the library to provide students with the facility for writing and with Internet Connectivity for access to e-books and on-line learning solutions. Students shall use computerized catalog for instant access to the resources in the library.

### **11.5. Tutorial Service for a Course Taught**

11.5.1 The faculty member of a course is the TUTOR of his/her students.

11.5.2 To enable the tutoring, the faculty member shall designate office hours and inform his students of the same. The faculty member is expected to be in his office during the hours designated.

### **11.6. Guidance and Counseling**

11.6.1 The office of student life shall provide professional guidance in a number of areas that contribute to the character development of students focusing on themes such as interpersonal relations, personal acceptance and care, life goals, survival skills, work ethics, relations with the opposite gender, community responsibility, right assertiveness, handling grievance and personal crisis, tolerance, reconciliation, time management, self-assessment, etc. in an open ended and non-judgmental manner.

11.6.2 The office of student life shall avail counseling service to those students that exhibit emotional burden, are at a loss, have a hard time focusing on their studies and responsibilities and show difficulty in relating to others. If the mental state of a student requires professional help, the student shall be told to seek professional help at his expense. Severe cases shall be allowed to take off a semester or a year.

11.6.3 As counseling revolves around trust, a female counselor shall be available for women and a male counselor for men. Peer counseling as well as peer discussion will also be advanced to facilitate the growth and discovery processes in a non-judgmental way.

11.6.4 All counseling communications will be confidential.

11.6.5 The college shall do its best to reduce impersonality and the kind of atomization that comes from large crowds. While the architecture of the college is designed to help in this regard by giving ample opportunities for students to interact with one another, every effort shall be made to provide a sense of community that encourages belongingness, involvement and high spirits.

11.6.6 Common problems shall addressed by the college and remedies sought as quickly as possible so that unaddressed problems do not cause more harm than what exists.

## **12. CLASS SIZE**

To enable manageable faculty attention to students, convenience of learning and the continuous assessment that shall be applied, the optimal class size of the college shall be:

- 30 students for core courses in a regular class,
- 80 students for common courses,
- 30 students for laboratories and workshops.

## **13. ROLES OF THE INSTRUCTOR AND STUDENTS**

### **13.1 The Instructor's Roles**

- The instructor will prepare course syllabus/course outlines
- Prepare lecture notes, and impart class room lecture
- Prepare lab manuals and facilitates lab sessions
- Facilitating students' learning in group activities, class room sessions, and outreach programs
- Facilitate students' learning by Demonstration
- Consultancy
- providing students with illustrated learning materials
- Encourage and reinforce students' independent works
- Assessing, evaluation , and grading students' performances

### **13.2 Roles of students**

- Respecting the college's rules and regulations
- Attending classes without absentees
- Doing all the academic activities in time and according to given instructions
- Active participation in the class room or outside the class learning sessions such as laboratory activities and field works
- Engaging in new concepts, skills and attitudes

## **14. PROGRAM STRUCTURE**

The Food Science and Technology program is designed to be completed within eight semesters. Each semester shall have 16 weeks of regular classes.

There shall be a six credit hours internship program after completion of the six semesters. During such period, students will have a chance to work in an actual work setting using their competency.

The courses in the program are core and supportive totally encompassing 144 credit hours. The core courses are compulsory and shall be 105 credit hours for any student in this program to graduate.

The core and supportive courses are presented below.

## 15. LIST OF ALL COURSES IN FOOD SCIENCE

### 15.1 List of Core Courses

| Course No. | Course Title                                      | Cr. Hr.    | Lec. Hr. | Lab. Hr. | Pre-Requisite                  |
|------------|---|------------|----------|----------|--------------------------------|
| FSTH 211   | Fundamentals of Food Science                      | 3          | 3        |          | None                           |
| FSTH 212   | Fundamentals of Nutrition Science                 | 3          | 3        |          | None                           |
| FSTH 222   | Organic Chemistry for food science and Technology | 4          | 3        | 3        | CHEM 201                       |
| FSTH 311   | Principles of Food Processing                     | 4          | 4        | 1        | FSTH 211 , FSTH 222 & PHY 201  |
| FSTH 321   | Food Biochemistry                                 | 4          | 3        | 2        | BIO 201 & CHEM 201             |
| FSTH 331   | Human Nutrition and Health I                      | 3          | 3        |          | FSTH 212 & 222                 |
| FSTH 312   | Food Microbiology                                 | 4          | 3        | 2        | FSTH 321                       |
| FSTH 322   | Food Chemistry                                    | 4          | 3        | 2        | FSTH 311 & FSTH 321            |
| FSTH 411   | Food Analysis                                     | 4          | 3        | 3        | FSTH 322                       |
| FSTH 421   | Research Methods for Food Science                 | 3          | 3        |          | STAT 301                       |
| FSTH 431   | Human Nutrition and Health II                     | 3          | 3        |          | FSTH 331                       |
| FSTH 441   | Food Packaging                                    | 3          | 3        |          | FSTH 311                       |
| FSTH 451   | Computational Methods in Food Science             | 3          | 3        |          | STAT 301 & Math 201            |
| FSTH 461   | Food Product Development                          | 3          | 3        |          | None                           |
| FSTH 412   | Drawing in Process Engineering                    | 3          | 2        | 2        | None                           |
| FSTH 422   | Food Safety and Sanitation                        | 3          | 3        |          | FSTH 312 & FSTH 411            |
| FSTH 432   | Food Industry Management                          | 4          | 4        |          | None                           |
| FSTH 442   | Principles of Food Engineering                    | 4          | 4        | 1        | FSTH 311 & FSTH 441            |
| FSTH 452   | Sensory Evaluation                                | 3          | 3        | 1        | FSTH 451 & FSTH 431            |
| FSTH 511   | Food Marketing and world issues                   | 3          | 3        |          |                                |
| FSTH 521   | Fermentation Technology                           | 3          | 3        |          | FSTH 211                       |
| FSTH 531   | Food Toxicology                                   | 3          | 3        | 3        | FSTH 322 & FSTH 431            |
| FSTH 541   | Cereal & Legume Technology                        | 3          | 3        |          | FSTH 311 & 442                 |
| FSTH 551   | Fruit and Vegetable Technology                    | 3          | 3        |          | FSTH 311 & 312                 |
| FSTH 561   | Technology of Meat, Fish and Poultry Products     | 3          | 3        |          | FSTH 311 & 442                 |
| FSTH 571   | Internship  | 3          | 3        |          | Six Semester courses           |
| FSTH 512   | Technology of Fat and Oil processing              | 3          | 3        | 1        | FSTH 411 & 442                 |
| FSTH 522   | Food Biotechnology                                | 3          | 3        |          | FSTH 521 & FSTH 442            |
| FSTH 532   | Technology of Dairy Products                      | 3          | 3        | 2        | FSTH 442                       |
| FSTH 542   | Food Legislation and Quality Control              | 4          | 3        | 3        | Stat 201, FSTH 412 , 422 & 531 |
| FSTH 552   | Senior Project                                    | 6          |          |          | STAT 301 , FSTH 421& 451       |
|            | <b>Total</b>                                      | <b>105</b> |          |          |                                |

### 15.2 List of Supportive Courses

| Course No. | Course Title   | Cr. Hr.   | Lecture Hr. | Lab. Hr. | Pre-Requisite |
|------------|--|-----------|-------------|----------|---------------|
| BIOL 201   | General Biology  | 4         | 3           | 3        |               |
| CHEM 201   | General Chemistry  | 4         | 3           | 3        |               |
| PHYS 201   | Applied Physics  | 4         | 3           | 3        |               |
| MATH 201   | Applied Mathematics                                      | 3         | 3           |          |               |
| INSY 201   | Introduction to Information and Communication Technology | 3         | 2           | 2        |               |
| STAT 301   | Basic Statistics   | 3         | 3           |          |               |
| MAEN 211   | Introduction to Entrepreneurship                         | 3         | 3           |          |               |
| FLEN 201   | Basic Writing Skills                                     | 3         | 3           |          |               |
| FLEN 202   | English for communication I                              | 3         | 3           |          | FLEN 201      |
| FLEN 301   | English for communication II                             | 3         | 3           |          | FLEN 202      |
| CEED 201   | Civics and Ethical Education                             | 3         | 3           |          |               |
| PSYC 201   | General Psychology                                       | 3         | 3           |          |               |
|            | <b>Total</b>   | <b>39</b> |             |          |               |

### 15.3. Minimum Qualified Credit Hour Summary

| Course Category                               | Credit Hour |
|---|-------------|
| Major Course Requirement including Internship | 105         |
| Supportive Courses                            | 39          |
| <b>Grand Total</b>                            | <b>144</b>  |



## 15.4. Semester schedule

| FIRST YEAR            |  |           |
|-----------------------|--|-----------|
| SEMESTER I            |  |           |
| Course number         | Course title                                 | Credits   |
| BIOL 201              | General Biology                              | 4         |
| CHEM 201              | General Chemistry                            | 4         |
| FLEN 201              | Basic Writing Skills                         | 3         |
| MATH 201              | Applied Mathematics                          | 3         |
| FSTH 211              | Fundamentals of Food Science                 | 3         |
| <b>Semester Total</b> |  | <b>17</b> |
| SEMESTER II           |  |           |
| Course number         | Course title                                 | Credits   |
| INSY 201              | Introduction to Information & Communication  | 4         |
| FLEN 202              | English for Communication I                  | 3         |
| STAT 301              | Basic Statistics                             | 3         |
| FSTH 212              | Fundamentals of Nutrition Science            | 3         |
| FSTH 222              | Organic Chemistry for Food Science           | 4         |
| <b>Semester Total</b> |  | <b>17</b> |
| SECOND YEAR           |  |           |
| SEMESTER I            |  |           |
| PHYS 201              | Applied Physics                              | 4         |
| FLEN 301              | English for communication II                 | 3         |
| FSTH 321              | Biochemistry for food science and Technology | 4         |
| FSTH 311              | Principles of Food Processing                | 4         |
| FSTH 331              | Human Nutrition and Health I                 | 3         |
| <b>Semester Total</b> |  | <b>18</b> |
| SEMESTER II           |  |           |
| PSYC 201              | General Psychology                           | 3         |
| CEED 201              | Civics and Ethical Education                 | 3         |
| MAEN 211              | Introduction to Entrepreneurship             | 3         |
| FSTH 312              | Food Microbiology                            | 4         |
| FSTH 322              | Food Chemistry                               | 4         |
| <b>Semester Total</b> |  | <b>17</b> |
| THIRD YEAR            |  |           |
| SEMESTER I            |  |           |
| Course number         | Course title                                 | Credits   |
| FSTH 411              | Food Analysis                                | 4         |
| FSTH 421              | Research Methods for Food Science            | 3         |
| FSTH 431              | Human Nutrition and Health II                | 3         |
| FSTH 441              | Food Packaging                               | 3         |
| FSTH 451              | Computational methods in Food Science &      | 3         |

|                           |   |                |
|---------------------------|---|----------------|
|                           | Technology                                    |                |
| FSTH 461                  | Food Product Development                      | 3              |
| <b>Semester Total</b>     |   | <b>19</b>      |
| <b>S E M E S T E R II</b> |   |                |
| <b>Course number</b>      | <b>Course title</b>                           | <b>Credits</b> |
| FSTH 412                  | Drawing in process Engineering                | 3              |
| FSTH 422                  | Food Safety and Sanitation                    | 3              |
| FSTH 432                  | Food Industry Management                      | 4              |
| FSTH 442                  | Principles of Food Engineering                | 4              |
| FSTH 452                  | Sensory Evaluation                            | 3              |
| <b>Semester Total</b>     |   | <b>17</b>      |
| <b>FOURTH YEAR</b>        |   |                |
| <b>S E M E S T E R I</b>  |   |                |
| <b>Course number</b>      | <b>Course title</b>                           | <b>Credits</b> |
| FSTH 511                  | Food Marketing and world issues               | 3              |
| FSTH 521                  | Fermentation Technology                       | 3              |
| FSTH 531                  | Food Toxicology                               | 3              |
| FSTH 541                  | Cereal and Legume Technology                  | 3              |
| FSTH 551                  | Fruit and Vegetable Technology                | 3              |
| FSTH 561                  | Technology of Meat, Fish and Poultry Products | 3              |
| FSTH 571                  | Internship                                    | 3              |
| <b>Semester Total</b>     |   | <b>21</b>      |
| <b>S E M E S T E R II</b> |   |                |
| <b>Course number</b>      | <b>Course title</b>                           | <b>Credits</b> |
| FSTH 512                  | Technology of Fat and Oil processing          | 3              |
| FSTH 522                  | Food Biotechnology                            | 3              |
| FSTH 532                  | Technology of Dairy Products                  | 3              |
| FSTH 542                  | Quality Control in Food Systems               | 4              |
| FSTH 552                  | Senior Project Paper                          | 6              |
| <b>Semester Total</b>     |   | <b>19</b>      |

## 15.5. COURSE DESCRIPTION

### 15.5.1. Core Courses

|   |
|---|
| <b>Course title: Fundamentals of Food Science</b>   |
| <b>Module Code: FSTH 211</b>  |
| <b>Credit value of Module: 3 Cr. Hr</b>   |
| <b>Description of Module:</b><br>This module introduces and surveys the broad and complex interrelationships among food ingredients, processing, packaging, distribution and storage, and explores how these factors influence food quality and safety. Reflects recent advances and emerging technologies in the area. This module covers the basic chemical structures and properties of proteins, carbohydrates, lipids, enzymes, minerals, vitamins and water and their roles in food systems.      |
| <b>Learning outcomes:</b><br>On successful completion of this module students should be able to: <ul style="list-style-type: none"><li>• Understand what constitutes food science as a discipline</li><li>• Understand the role of a food scientist</li><li>• Be familiar with chemical structures and properties of protein, carbohydrate, lipid, enzymes, minerals, vitamins and water.</li><li>• Explain chemical reactions of major food components in foods</li></ul>                              |
| <b>Content:</b><br>Topic 1-Introduction: Food Science as a discipline<br>Topic 2- Characteristics of the food industry<br>Topic 3-Constituents of foods: Food groups, properties and significance.<br>Topic 4- Nutritive aspects of food constituents<br>Topic 5- Biotechnology   |
| <b>Teaching strategy/methods:</b><br>Lecture and seminar (Selected topics presented by each student or group of students)   |
| <b>Assessment criteria:</b><br>Presentations of self-reading topics<br>Group work<br>Final Exam   |
| <b>The respective role of instructors and students:</b><br><b>Students</b><br>Attend sessions<br>Carry out, present and discuss individual and group tasks<br>Carry out reading assignments<br>Reflect on feedbacks and take actions<br><b>Instructors</b><br>Conduct block teaching<br>Facilitate students individual and group activities<br>Assess students performance<br>Provide timely feedback and make follow-up on resulting developments<br>Plan and implements students consultation program |
| <b>Teaching strategy/methods:</b>   |

Lectures, Discussions, Reading Assignments, Guidance of project work, Exercises supported by reports and presentations

**Pre-requisite module code(s):** None

**Co-requisite module code (s):**

**Barred combination module (s):** None

**Module requirements:** good writing and oral presentation skills, extensive reading.

**Module calendar:**

Semester I

**Textbook**

- ◆ Norman N. Potter, Joseph H. Hotchkiss (1998).-Food Science, Repr of 5th Ed. Springer.
- ◆ Parker,R. (2003). *Introduction to food science*.-Thompson Learning.

**Reading materials**

- ◆ Fennema, O., 1996. *Food Chemistry* 3<sup>rd</sup> edition Marcel Dekker, N.Y.
- ◆ Casimir C. Akoh and David B. Min. 2002. *Food Lipid*; Marcel Dekker, N.Y.
- ◆ Richard E. McDonald and David B. Min. 1996. *Food Lipids and Health*. Marcel Dekker, N.Y.

|   |  |        |  |        |                    |       |
|---|--|--------|--|--------|--------------------|-------|
| <b>Course title: Fundamentals of Nutrition Science</b>  |  |        |  |        |                    |       |
| <b>Module Code: FSTH 212</b>  |  |        |  |        |                    |       |
| <b>Credit value of Module: 3 Cr. Hr</b>   |  |        |  |        |                    |       |
| <p><b>Description of Module:</b><br/>Introduction to nutrition, macro (energy requirement) and micronutrients, nutritional assessment: emergency nutrition assessment, dietary assessment; public health nutrition: macro and micronutrient deficiencies, nutrition and health linkages, nutrition transition and food security.</p>  |  |        |  |        |                    |       |
| <p><b>Learning outcomes:</b><br/>Upon completion of this module, students will be able to:<br/>-Provide an overview of the major macro and micronutrients relevant to human health<br/>-Know the nutritional quality of food products and the components of a food equilibrium ration<br/>-Understand the different concepts of malnutrition, under nutrition, obesity and nutrition transition<br/>-Discuss the scientific rationale for defining nutritional requirements in healthy individuals and population with reference to specific conditions<br/>-Present current evidence for the role of key nutrients in the prevention of chronic diseases<br/>-discuss major nutrition related diseases and the impacts of food behaviors on nutrition and health</p> |  |        |  |        |                    |       |
| <p><b>Content:</b><br/>Topic 1 : Basic concept of food, balanced diet, nutrition and health<br/>Topic 2 : Classification of Nutrients<br/>    ✓ Macronutrients (Carbohydrates, Lipids and Protein)<br/>    ✓ Micronutrient (Vitamin, Mineral) and water<br/>Topic 3 : Nutrient digestion, absorption and transport system<br/>Topic 4 : Structures in the nutrient components<br/>Topic 5 : Physical and chemical properties of Nutrients<br/>Topic 6 : Energy balance and body Composition</p>   |  |        |  |        |                    |       |
| <p><b>Teaching strategy/methods:</b><br/>Lectures, Discussions, Reading Assignments, Guidance of project work, Exercises supported by reports and presentations</p>   |  |        |  |        |                    |       |
| <p><b>Assessment criteria:</b></p> <table> <tr> <td>Evaluation of assignments and presentation</td> <td>- 20 %</td> </tr> <tr> <td>Evaluation with tests and other activities</td> <td>- 40 %</td> </tr> <tr> <td>Final Written Exam</td> <td>- 40%</td> </tr> </table>   | Evaluation of assignments and presentation | - 20 % | Evaluation with tests and other activities | - 40 % | Final Written Exam | - 40% |
| Evaluation of assignments and presentation  | - 20 %                                     |        |  |        |                    |       |
| Evaluation with tests and other activities  | - 40 %                                     |        |  |        |                    |       |
| Final Written Exam  | - 40%                                      |        |  |        |                    |       |
| <p><b>The respective role of instructors and students:</b></p> <p><b>Students</b><br/>Attend sessions<br/>Carry out, present and discuss individual and group tasks<br/>Carry out reading assignments<br/>Reflect on feedbacks and take actions</p> <p><b>Instructors</b><br/>Conduct block teaching<br/>Facilitate students individual and group activities</p>  |  |        |  |        |                    |       |

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| <p>Assess students performance<br/> Provide timely feedback and make follow-up on resulting developments<br/> Plan and implements students consultation program</p>   |
| <p><b>Teaching support and inputs for each content:</b></p> <ul style="list-style-type: none"> <li>- Self-reading</li> <li>- Lecture notes</li> <li>- Group projects and discussions</li> <li>- Critical review of published articles</li> </ul>  |
| <p><b>Pre-requisite module code(s): None</b></p>  |
| <p><b>Co-requisite module code (s):</b></p>   |
| <p><b>Barred combination module (s): None</b></p>   |
| <p><b>Module requirements:</b> good writing and oral presentation skills, extensive reading.</p>  |
| <p><b>Module calendar:</b><br/> Semester I</p>  |
| <p><b>Textbooks</b></p> <ol style="list-style-type: none"> <li>1. Marry E. Barasi. Human Nutrition. A Health Perspective 2nd Edition. Hodder Arnold. 2003. London</li> <li>2. Eleanor W., May H. Understanding Nutrition. West publishing Company. 1977. USA</li> <li>3. Catherine G., Hilary p. Human Nutrition. Elsevier. 2005. UK</li> </ol> <p><b>Reading materials</b></p> <ol style="list-style-type: none"> <li>4. Roach B. Metabolism and Nutrition. 2003. London</li> <li>5. Hui. Y. H. Editor. Food Biochemistry and Food Processing. Blackwell. 2006. USA</li> <li>6. Srinivasan D., Kirk L., Owen R. Fennema. Fennema’s food Chemistry. Fourth edition. CRC Press. 1996.</li> </ol> |

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| <b>Course title: Organic Chemistry for Food Science and Technology</b>  |
| <b>Module Code: FSTH 222</b>  |
| <b>Credit value of Module: 4 Cr. Hr</b>   |
| <p><b>Description of Module:</b></p> <p>The course is a survey of the chemistry of carbon compounds, their nomenclature, physical properties, structure and reactions with an introduction to reaction mechanisms and instrumental analysis. It also emphasizes the millions of distinct carbon compounds known and classified. Moreover, it dwells on carbon that is central to the existence of life as it is an essential component of nucleic acids (DNA and RNA), sugars, lipids, and proteins. The course familiarizes students with application to various topics, such as the study of polymers (plastics and other materials), hydrocarbons, pharmaceuticals, molecular biology, biochemistry, and other life sciences. Students will also learn the basic concepts needed to understand the three-dimensional structure of an organic molecule, predict the reactivity of a given molecule (based on its chemical structure), and recognize the mechanisms behind a chemical reaction. Furthermore, students shall explore different explanations of how atoms bind in carbon-based molecules and learn about the simplest carbon structures (alkanes) before moving on to more complex carbon structures (alkenes and alkynes) and their reactions.</p>  |
| <p><b>Learning outcomes:</b></p> <p>On successful completion of this module students should be able to:</p> <ol style="list-style-type: none"> <li>1. Demonstrate proficiency in the nomenclature of organic molecules; Describe organic molecules in terms of bonding, stereochemistry, functional groups, and resonance.</li> <li>2. Derive the intermolecular force of given molecules based on their chemical structures.</li> <li>3. Draw and represent organic molecules, using arrow notation to show the movement of electrons.</li> <li>4. Demonstrate proficiency in identifying various classes of reactions (i.e. addition, elimination, arrangements) and; describe the thermodynamics of organic reactions using energy diagrams.</li> <li>5. Analyze the stereochemistry of simple organic molecules and the stereo chemical consequences of reactions.</li> <li>6. Demonstrate proficiency in Newman projections and conformations of cyclohexanes.</li> <li>7. Demonstrate proficiency in determining whether alkyl halides will undergo a substitution or elimination reaction for a given set of reaction conditions.</li> <li>8. Describe the basic reaction mechanisms of alcohols; demonstrate proficiency in calculating the degree of unsaturation of molecules.</li> <li>9. Describe the basic reaction mechanisms of alkenes and alkynes; Explain the concept of chirality, optical activity, and stereoisomerism; Explain the concept of a carbocation, which is an ion with a positively-charged carbon.</li> </ol> |
| <p><b>Content:</b></p> <p>Topic 1. Bonding</p> <p>Topic 2. Inductive and Resonance effects</p> <p>Topic 3. Functionality</p> <p>Topic 4. Equilibria Reaction Rates</p> <p>Topic 5. Stereochemistry</p> <p>Topic 6. Molecular Spectroscopy Application in Structural Determination</p> <p>Topic 7. Reactions in Organic Compounds</p>  |

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|---|
| Topic 8. Biological Molecules   |
| <b>Teaching strategy/methods:</b><br>Lecture and seminar (Selected topics presented by each student or group of students)   |
| <b>Assessment criteria:</b><br>Presentations of self-reading topics<br>Group work<br>Final Exam   |
| <b>The respective role of instructors and students:</b><br><b>Students</b><br>Attend sessions<br>Carry out, present and discuss individual and group tasks<br>Carry out reading assignments<br>Reflect on feedbacks and take actions<br><b>Instructors</b><br>Conduct block teaching<br>Facilitate students individual and group activities<br>Assess students performance<br>Provide timely feedback and make follow-up on resulting developments<br>Plan and implements students consultation program |
| <b>Teaching strategy/methods:</b><br>Lectures, Discussions, Reading Assignments, Guidance of project work, Exercises supported by reports and presentations   |
| <b>Pre-requisite module code(s): CHEM 201</b>   |
| <b>Co-requisite module code (s):</b>  |
| <b>Barred combination module (s):</b> None  |
| <b>Module requirements:</b> good writing and oral presentation skills, extensive reading.   |
| <b>Module calendar:</b><br>Semester II  |
| <b>Textbook</b><br>Organic Chemistry 4 <sup>th</sup> Ed., L.G.Wade, 2006. ;<br><b>Reference (s):</b><br>1. F. Carey. 2000. Organic Chemistry. 4 <sup>th</sup> Ed.,<br>2. Brown, <i>et.al.</i> 2008. Organic Chemistry. Hybrid Edition.  |



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|---|
| <b>Course Title: Food Biochemistry</b>  |
| <b>Module Code: FSTH 321</b>  |
| <b>Credit value of Module: 4 Cr. Hr</b>   |
| <b>Description of Module:</b><br>This module covers the basic chemical structures and properties of proteins, carbohydrates, lipids, enzymes, minerals, vitamins and water and their roles in food systems.   |
| <b>Learning outcomes:</b><br>On successful completion of this module students should be able to: <ul style="list-style-type: none"> <li>• Be familiar with chemical structures and properties of protein, carbohydrate, lipid, enzymes, minerals, vitamins and water.</li> <li>• Explain chemical reactions of major food components in foods</li> </ul>  |
| <b>Content:</b><br>Topic 1- Introduction: Definition of major components of food<br>Topic 2- Enzymes : Classification, naming<br>Topic 3- Proteins: Classification, nomenclature, and structures of amino acids, isoelectric point and solubility as a function of pH, protein denaturation and its effects on food systems, nutritional quality of protein. Theories & applications of analytical methods for protein and amino acids determination.<br>Topic 4- Carbohydrates: functions of carbohydrates in foods, chemical reactions; analytical methods for carbohydrate determination.<br>Topic 5- Lipids: Nomenclature and structures of fatty acids, classifications of lipids, physical and chemical characteristics of different fats; Lipid oxidation mechanisms, Analytical methods for determining different physical and chemical characteristics of fat.<br>Topic 6- Minerals and Vitamins: Functions of some minerals; Water soluble and fat soluble vitamins, chemical reactions and losses of vitamins during processing and storage. |
| <b>Teaching strategy/methods:</b><br>lecture and seminar (Selected topics presented by each student or group of students)   |
| <b>Assessment criteria:</b><br>Presentations of self-reading topics<br>Group work<br>Final Exam   |
| <b>The respective role of instructors and students:</b><br><b>Students</b><br>Attend sessions<br>Carry out, present and discuss individual and group tasks<br>Carry out reading assignments<br>Reflect on feedbacks and take actions<br><b>Instructors</b><br>Conduct block teaching<br>Facilitate students individual and group activities<br>Assess students performance<br>Provide timely feedback and make follow-up on resulting developments<br>Plan and implements students consultation program   |
| <b>Teaching support and inputs for each content:</b><br>- Lecture notes   |

|  |
|--|
| <ul style="list-style-type: none"> <li>- Group projects and discussions</li> <li>- Reading materials</li> </ul>  |
| <b>Pre-requisite module code(s):</b> BIOL 201 & CHEM 201   |
| <b>Co-requisite module code (s):</b>   |
| <b>Barred combination module (s):</b> None   |
| <b>Module requirements:</b> good writing and oral presentation skills, extensive reading.  |
| <b>Module calendar:</b><br>Semester II   |
| <p><b>Textbook</b><br/> <u>Yiu H. Hui, Wai-Kit Nip.</u>,(2006). <i>Food biochemistry and food processing</i>, Wiley-Blackwell.<br/> Fennema, O.,1996. <i>Food Chemistry</i> 3<sup>rd</sup> edition Marcel Dekker, N.Y.</p> <p><b>Reading materials</b><br/> Casimir C. Akoh and David B. Min. 2002. <i>Food Lipid</i>; Marcel Dekker, N.Y.<br/> Richard E. McDonald and David B. Min. 1996. <i>Food Lipids and Health</i>. Marcel Dekker, N.Y.</p> |

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|---|
| <b>Course Title: Principles of Food Processing</b>  |
| <b>Module Code: FSTH 311</b>  |
| <b>Credit value of Module: 4 Cr. Hr</b>   |
| <p><b>Description of Module:</b><br/> This course will introduce food processing and preservation topics as well as build on fundamentals. It covers basic principles, equipment and quality assessment for food processing and preservation operations such as mixing, separation, blanching, pasteurization, extrusion, baking, frying, chilling and packaging. Integrated laboratory sessions will provide students with hands-on experiences of the food processing principles learned in the class. By conducting the term project and oral presentation, students will integrate and apply the food processing concepts, principles and skills to solve the real-world problems.</p>  |
| <p><b>Learning outcomes:</b><br/> After completion of this module, students will be able to grasp:</p> <ol style="list-style-type: none"> <li>1. Describe the fundamentals of food processing and preservation</li> <li>2. Gain an understanding of basic food processing unit operations.</li> <li>3. Integrate concepts in chemistry, biochemistry, physics, engineering, mathematics with food processing operations and understand their role in processing of food.</li> <li>4. Gain the ability to think critically about problems and issues in food processing.</li> <li>5. Explain, analyze and evaluate scenarios related to various unit operations in food processing</li> <li>6. Make an appreciation of the food processing industry's role in society.</li> <li>7. Use the research literature on the subjects and analyze situations in which the food processing principles may be utilized</li> </ol> |
| <p><b>Content:</b><br/> Topic 1- Basic concepts on matters, properties and mass transfer<br/> Topic 2- Size reduction; theories of solids and liquids mixing; centrifugation; membrane processing; fermentations, irradiation, microwave and infrared<br/> Topic 3- Thermal decomposition of Microorganism and Enzymes<br/> Topic 4- High temperature processes : evaporation; extrusion; dehydration; baking, roasting and frying<br/> Topic 5- low temperature processes:- chilling; freezing; freeze-drying and freeze concentration<br/> Topic 6- Advanced technology of food processing: high-pressure, ohmic heating, pulsed light and pulsed electric field, magnetic field, irradiation processing, radio frequency heating, microwave heating, combined technologies, supercritical fluid processing<br/> Topic 7: Overview of Ethiopian food processing industries</p>  |
| <p><b>Teaching strategy/methods:</b><br/> -The subject will be developed through extended lecture notes and theoretical exercises in which the syllabus topics will be reviewed, discussed and analyzed.<br/> -Students will spend a significant amount of time in self-directed study, reading etc.<br/> - Some of the topics will be covered through group projects</p>   |
| <p><b>Assessment criteria:</b><br/> -students should write 2 review papers on the state of Ethiopian food processing industries and present it to the class<br/> - Exam</p>   |

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| <ul style="list-style-type: none"> <li>- Presentation skills and attendance</li> <li>- Field trip</li> <li>- Group work</li> </ul>   |
| <p><b>The respective role of instructors and students:</b></p> <p><b>Students</b><br/> Attend sessions<br/> Carry out, present and discuss individual and group tasks<br/> Carry out reading assignments<br/> Reflect on feedbacks and take actions</p> <p><b>Instructors</b><br/> Conduct block teaching<br/> Facilitate students individual and group activities<br/> Assess students performance<br/> Provide timely feedback and make follow-up on resulting developments<br/> Plan and implements students consultation program</p> |
| <p><b>Teaching support and inputs for each content:</b></p> <ul style="list-style-type: none"> <li>- Self-reading</li> <li>- Visit of food industries</li> <li>- Lecture notes</li> <li>- Group projects and discussions</li> </ul>  |
| <p><b>Pre-requisite module code(s): FSTH 211,FSTH 222 &amp; PHY 201</b></p>  |
| <p><b>Co-requisite module code (s):</b></p>  |
| <p><b>Barred combination module (s): None</b></p>  |
| <p><b>Module requirements:</b> good writing and oral presentation skills, extensive reading.</p>   |
| <p><b>Module calendar:</b> Semester II</p>   |
| <p><b>Textbooks</b><br/> Fellows, P. J. (2000). Food Processing Technology. 2nd edition. Cambridge: Woodheads Publishing<br/> Brennan, J. G. (2006). Food Processing Handbook.Willey-VCH.</p>  |

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| <b>Course title: Human Nutrition and Health I</b>  |
| <b>Module Code: FSTH 331</b>   |
| <b>Credit value of Module: 3 Cr. Hr</b>  |
| <p><b>Description of Module:</b><br/> The course will introduce to students in the metabolism of nutrients in the human body at different life stage, their role in the development and prevention of disease and the techniques for assessment in nutrition and achieve strategic based on the grounded problem in the national goals.</p>  |
| <p><b>Learning outcomes:</b><br/> After completion of this module, students will be able to grasp:</p> <ol style="list-style-type: none"> <li>1. Gain an understanding of metabolism of nutrients in the human body</li> <li>2. How the components of foods are important in body maintenance</li> <li>3. How energy is distributed with the physical condition</li> </ol>   |
| <p><b>Content:</b></p> <p>Topic 1 : Basic Concepts</p> <ul style="list-style-type: none"> <li>✓ Review of Fundamental of Nutrition as back ground</li> <li>✓ Components of food/Nutrients- (macro and micro-nutrients)</li> </ul> <p>Topic 2 : Functions and Metabolism of Nutrients</p> <p>Topic 3 : The link between nutrition and preventive medicine</p> <p>Topic 4 : Malnutrition, Under nutrition, Food transition, Functions of food</p>  |
| <p><b>Teaching strategy/methods:</b></p> <ul style="list-style-type: none"> <li>-The subject will be developed through extended lecture notes and theoretical exercises in which the syllabus topics will be reviewed, discussed and analyzed.</li> <li>-Students will spend a significant amount of time in self-directed study, reading etc.</li> <li>- Some of the topics will be covered through group projects</li> </ul>   |
| <p><b>Assessment criteria:</b></p> <ul style="list-style-type: none"> <li>-students should write review papers on availability of nutrients on some meals available</li> <li>- Exam</li> <li>- Presentation skills and attendance</li> <li>- Group work</li> </ul>   |
| <p><b>The respective role of instructors and students:</b></p> <p><b>Students</b></p> <p>Attend sessions</p> <p>Carry out, present and discuss individual and group tasks</p> <p>Carry out reading assignments</p> <p>Reflect on feedbacks and take actions</p> <p><b>Instructors</b></p> <p>Conduct block teaching</p> <p>Facilitate students individual and group activities</p> <p>Assess students performance</p> <p>Provide timely feedback and make follow-up on resulting developments</p> <p>Plan and implements students consultation program</p> |
| <p><b>Teaching support and inputs for each content:</b></p> <ul style="list-style-type: none"> <li>- Self-reading</li> <li>- Visit of food industries</li> </ul>   |

|   |
|---|
| <ul style="list-style-type: none"> <li>- Lecture notes</li> <li>- Group projects and discussions</li> </ul>   |
| <b>Pre-requisite module code(s): FSTH 212&amp; FSTH 222</b>   |
| <b>Co-requisite module code (s):</b>  |
| <b>Barred combination module (s):</b> None  |
| <b>Module requirements:</b> good writing and oral presentation skills, extensive reading.   |
| <b>Module calendar:</b> Semester II   |
| <b>Textbooks</b> <ol style="list-style-type: none"> <li>1. Whitney E. and Rolfes S.R. (2008). Understanding nutrition. 11<sup>th</sup> Edi. Thomson Wardsworth.</li> <li>2. Gibney M.J, Lanham-New S.A, Cassidy A., Vorster H.H. (2009). Introduction to Human Nutrition . 2<sup>nd</sup> Edi. Wiley Blackwell. USA.</li> </ol> |

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| <b>Course title: Food Microbiology</b>  |
| <b>Module Code: FSTH 312</b>  |
| <b>Credit value of Module: 4 Cr. Hr</b>   |
| <p><b>Description of Module:</b><br/>Introduction to general microbiology, role and significance of microorganisms in foods, intrinsic and extrinsic parameters that affect microbial growth, maintenance and cultivation of microorganisms, strain improvement and selection, food spoilage, food-borne pathogens, food preservation, microbial fermentation, review traditional fermented foods</p>   |
| <p><b>Learning outcomes:</b><br/>After completion of this module, students will be able to grasp:</p> <ul style="list-style-type: none"> <li>• Appreciate the intrinsic and extrinsic properties that affect microbial growth</li> <li>• Be able to maintain and cultivate microorganisms</li> <li>• Explain how food is spoiled and how this could be prevented through various preservation mechanisms</li> <li>• Be familiar with Ethiopian traditional fermented foods</li> </ul>                                     |
| <p><b>Content:</b><br/>Topic 1 : Introduction to general microbiology: definition of terms<br/>Topic 2 : The role of microorganisms in foods<br/>Topic 3 : Intrinsic and extrinsic parameters affecting microbial growth<br/>Topic 4 : Maintenance and cultivation of microorganisms<br/>Topic 5 : Strain improvement and selection<br/>Topic 6 : Food spoilage and preservation techniques<br/>Topic 7 : Microbial fermentation</p>  |
| <p><b>Teaching strategy/methods:</b><br/>-The subject will be developed through extended lecture notes and theoretical exercises in which the syllabus topics will be reviewed, discussed and analyzed.<br/>-Students will spend a significant amount of time in self-directed study, reading etc.<br/>- Some of the topics will be covered through group projects</p>  |
| <p><b>Assessment criteria:</b><br/>- Exam<br/>- Presentation skills and attendance<br/>- Field trip<br/>- Group work</p>  |
| <p><b>The respective role of instructors and students:</b><br/><b>Students</b><br/>Attend sessions<br/>Carry out, present and discuss individual and group tasks<br/>Carry out reading assignments<br/>Reflect on feedbacks and take actions<br/><b>Instructors</b><br/>Conduct block teaching<br/>Facilitate students individual and group activities<br/>Assess students performance<br/>Provide timely feedback and make follow-up on resulting developments<br/>Plan and implements students consultation program</p> |
| <b>Teaching support and inputs for each content:</b>  |

- Self-reading
- Visit of food industries
- Lecture notes
- Group projects and discussions

**Pre-requisite module code(s): FSTH 321**

**Co-requisite module code (s):**

**Barred combination module (s):** None

**Module requirements:** good writing and oral presentation skills, extensive reading.

**Module calendar:** Semester II

◆ **Textbooks**

- ◆ Adams, M.R. and Moss, M.O. 2000. Food Microbiology. 2nd Edition, Royal Society of Chemistry, Cambridge.
- ◆ Gerard J.Tortora, Berdell R. Funke and Christine L. Case.1992. Microbiology, An Introduction 4<sup>th</sup> edition.
- ◆ Ray, B. 2000. Fundamental Food Microbiology. 2nd Edition, CRC Press. New York. USA.



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| <b>Course title: Food Chemistry</b>  |
| <b>Module Code: FSTH 322</b>   |
| <b>Credit value of Module: 4 Cr. Hr</b>  |
| <b>Description of Module:</b><br>This module covers the basic chemical structures and properties of proteins, carbohydrates, lipids, enzymes, minerals, vitamins and water and their roles in food systems.  |
| <b>Learning outcomes:</b><br><b>On completion of this modules students will be able to:</b> <ul style="list-style-type: none"> <li>• Develop and upgrade skills in the nutrition labeling component analysis of processed foods</li> <li>• identify laboratory requirements in the conduct of analysis</li> <li>• appreciate principles and procedures in food analysis</li> <li>• familiarize with the application of accuracy and reproducibility and use on internal quality control procedures calculation</li> <li>• evaluate and prepare analysis report</li> <li>• Develop basic skills and techniques in food analysis</li> </ul>  |
| <b>Content:</b><br><b>Topic 1-Introduction:</b> Definition of major components of food<br><b>Topic 2-Proteins:</b> Classification, nomenclature, and structures of amino acids, Isoelectric point and solubility as a function of pH, protein denaturation and its effects on food systems, nutritional quality of protein. Theories & applications of analytical methods for protein and amino acids determination.<br><b>Topic 3-carbohydrates:</b> functions of carbohydrates in foods, chemical reactions; analytical methods for carbohydrate determination.<br><b>Topic 4- Lipids:</b> Nomenclature and structures of fatty acids, classifications of lipids, physical and chemical characteristics of different fats; Lipid oxidation mechanisms, Analytical methods for determining different physical and chemical characteristics of fat.<br><b>Topic 5- Minerals and Vitamins:</b> Functions of some minerals; Water soluble and fat soluble vitamins, chemical reactions and losses of vitamins during processing and storage. |
| <b>Teaching strategy/methods:</b><br>Lecture and seminar (Selected topics presented by each student or group of students)  |
| <b>Assessment criteria:</b><br>Presentations of self-reading topics<br>Group work<br>Final Exam  |
| <b>The respective role of instructors and students:</b><br><b>Students</b><br>Attend sessions<br>Carry out, present and discuss individual and group tasks<br>Carry out reading assignments<br>Reflect on feedbacks and take actions<br><b>Instructors</b><br>Conduct block teaching<br>Facilitate students individual and group activities<br>Assess students performance   |

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| Provide timely feedback and make follow-up on resulting developments<br>Plan and implements students consultation program   |
| <b>Teaching support and inputs for each content:</b> <ul style="list-style-type: none"> <li>- Laboratory demonstrations</li> <li>- Group projects and discussions</li> </ul>              |
| <b>Pre-requisite module code(s): FSTH 311 and FSTH 321</b>  |
| <b>Co-requisite module code (s):</b>  |
| <b>Barred combination module (s):</b> None  |
| <b>Module requirements:</b> good writing, extensive reading, hands on laboratory experience   |
| <b>Module calendar:</b><br>Semester III   |
| <b>Textbook</b><br>Fennema, O.,1996. <i>Food Chemistry</i> 3 <sup>rd</sup> edition Marcel Dekker, N.Y.<br>Casimir C. Akoh and David B. Min. 2002. <i>Food Lipid</i> ; Marcel Dekker, N.Y. |
| <b>Reading material</b><br>Richard E. McDonald and David B. Min. 1996. <i>Food Lipids and Health</i> . Marcel Dekker, N.Y.  |

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| <b>Course title: Food Analysis</b>  |
| <b>Module Code: FSTH 411</b>  |
| <b>Credit value of Module: 4 Cr. hr.</b>  |
| <p><b>Description of Module:</b><br/>         Analysis of proteins, lipids, carbohydrates, etc. Principles of spectroscopy, titration, electrophoresis and chromatography as applied to food. Other techniques such as reflective colorimetry, texture profile analysis and water activity measurement.</p>   |
| <p><b>Learning outcomes:</b><br/> <b>On completion of this modules students will be able to:</b></p> <ul style="list-style-type: none"> <li>• Develop and upgrade skills in the nutrition labeling component analysis of processed foods</li> <li>• identify laboratory requirements in the conduct of analysis</li> <li>• appreciate principles and procedures in food analysis</li> <li>• familiarize with the application of accuracy and reproducibility and use on internal quality control procedures calculation</li> <li>• evaluate and prepare analysis report</li> <li>• Develop basic skills and techniques in food analysis</li> </ul>  |
| <p><b>Content:</b></p> <p><b>Topic 1. Introduction</b> ( Reason for analyzing foods, properties of foods, analytical techniques)</p> <p><b>Topic 2. Evaluation of analytical data</b> (Measurement of central tendency and Reliability of analysis)</p> <p><b>Topic 3. Sampling methods</b> (Sampling Plan, Statistical consideration in sampling, preparation of samples)</p> <p><b>Topic 4. Analytical methods</b> (Total acidity, Equivalence point and acid Ratio, Organic acids in food, Physicochemical properties)</p> <p><b>Topic 5. Proximate analysis</b> (Analysis of moisture, ash, fat, protein, crude fibers, carbohydrate)</p> <p><b>Topic 6. Instrumentation</b> (Theory, principles and application of UV-Spec, AAS, HPLC, GC, MS, NMR in food analysis)</p> |
| <p><b>Teaching strategy/methods:</b><br/>         Laboratory demonstrations, hands-on food analysis experience, theoretical briefing.</p>   |
| <p><b>Assessment criteria:</b><br/>         Laboratory report<br/>         Final Exam</p>   |
| <p><b>The respective role of instructors and students:</b></p> <p><b>Students</b><br/>         Attend sessions<br/>         Carry out, present and discuss individual and group tasks<br/>         Carry out reading assignments<br/>         Reflect on feedbacks and take actions</p> <p><b>Instructors</b><br/>         Conduct block teaching<br/>         Facilitate students individual and group activities<br/>         Assess students performance<br/>         Provide timely feedback and make follow-up on resulting developments</p>   |

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| Plan and implements students consultation program  |
| <b>Teaching support and inputs for each content:</b> <ul style="list-style-type: none"> <li>- Laboratory demonstrations</li> <li>- Group projects and discussions</li> </ul>   |
| <b>Pre-requisite module code(s): FSTH 322</b>  |
| <b>Co-requisite module code (s):</b>   |
| <b>Barred combination module (s):</b> None   |
| <b>Module requirements:</b> good writing, extensive reading, hands on laboratory experience  |
| <b>Module calendar:</b><br>Semester III  |
| <b>Textbook</b><br>Nielsen, S. S. (2003). <i>Food Analysis</i> , 3rd edition. Technology and Engineering.<br>Leo, M.L. (2004). <i>Handbook of Food Analysis</i> , Second Edition -3 Volume Set (Food Science and Technology) |
| <b>Reading material</b><br>Otles, S. (2008). <i>Handbook of food analysis instruments</i> , 1 <sup>st</sup> edition.CRC.   |

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| <b>Course title: Research Methods in Food Science</b>   |
| <b>Module Code: FSTH 421</b>  |
| <b>Credit value of Module: 3 Cr. Hr</b>   |
| <p><b>Description of Module:</b></p> <p>In this module the main scientific research methods and scientific paper writing will be discussed and students will be encountered with techniques, methods and statistical tools to manipulate the data. Besides, the meaning of statistics, its importance and limitation, data collections, summarization, presentation, analysis and interpretations will be the focus of the module. Statistical method involves detail methods of describing data by means of tables, averages measures of variation and squeakiness, regression and correlation, probability distribution and research methods, design of experiment, Statistical package for social science, Emergency nutritional assessment.</p> |
| <p><b>Learning outcomes:</b></p> <p>At the end of this lesson students are able to:</p> <ul style="list-style-type: none"> <li>-Acquire basic knowledge of methods of data collection, summarization, analysis, interpretation and presentation. Students will also be equipped with basic skills on conducting and reporting research activities.</li> </ul>   |
| <p><b>Content:</b></p> <p><b>Topic 1</b> - Quantitative and qualitative research methods</p> <p><b>Topic 2</b> - Statistical tools and software packages</p> <p><b>Topic 3</b> - Scientific research paper writing</p> <p><b>Topic 4</b> - Experimental design</p>  |
| <p><b>Teaching strategy/methods:</b></p> <ul style="list-style-type: none"> <li>-Lecture notes</li> <li>-Small group interactive discussion</li> <li>-Case study</li> <li>-Assignments</li> </ul>   |
| <p><b>Assessment criteria:</b></p> <ul style="list-style-type: none"> <li>-critical review of selected published articles and presentation</li> <li>-Final Exam (case study type)</li> </ul>  |
| <p><b>The respective role of instructors and students:</b></p> <p><b>Students</b></p> <p>Attend sessions</p> <p>Carry out, present and discuss individual and group tasks</p> <p>Carry out reading assignments</p> <p>Reflect on feedbacks and take actions</p> <p><b>Instructors</b></p> <p>Conduct block teaching</p> <p>Facilitate students individual and group activities</p> <p>Assess students' performance</p> <p>Provide timely feedback and make follow-up on resulting developments</p> <p>Plan and implements students consultation program</p>   |
| <p><b>Teaching support and inputs for each content:</b></p> <ul style="list-style-type: none"> <li>- Self-reading</li> <li>- Review up to date methodologies</li> </ul>   |

- Lecture notes
- Group projects and discussions
- Critical review of published articles

**Pre-requisite module code(s): STAT 301**

**Co-requisite module code (s):**

**Barred combination module (s):** None

**Module requirements:** good writing and oral presentation skills, extensive reading.

**Module calendar:**

Semester I

**Textbook**

- M. Q. Patton, 1990. Qualitative Evaluation and Research Methods, Sage USA

**Reading materials**

- Louis M Rea and Richard A Parker, 2005. Designing and Conducting Survey Research.

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| <b>Course title: Human Nutrition and Health II</b>   |
| <b>Module Code: FSTH 431</b>   |
| <b>Credit value of Module: 3 Cr. Hr</b>  |
| <p><b>Description of Module:</b><br/> The course will introduce to students in the metabolism of nutrients in the human body at different life stage, their role in the development and prevention of disease and the techniques for assessment in nutrition and achieve strategic based on the grounded problem in the national goals.</p>  |
| <p><b>Learning outcomes:</b><br/> After completion of this module, students will be able to grasp:</p> <ul style="list-style-type: none"> <li>• Concepts of energy balances from food</li> <li>• Identify the major causes of diet related diseases</li> <li>• how to prevent different causes of dietary problem</li> <li>• how to implement the nutritional goal at national level</li> </ul>  |
| <p><b>Content:</b><br/> Topic 1 - Assessments in nutritional status<br/> Topic 2 - Nutritional needs during the life cycle (infancy, children, adolescents, breastfeeding and pregnant women and the elderly)<br/> Topic 3 - Major nutritional deficiency diseases</p> <ul style="list-style-type: none"> <li>✓ Protein Energy Malnutrition,</li> <li>✓ Vitamin A deficiency,</li> <li>✓ Iron deficiency anemia,</li> <li>✓ Iodine deficiency disorders</li> <li>✓ Causes, symptoms, treatment and prevention of nutritional deficiency diseases</li> </ul> <p>Topic 4 - Life style related diseases</p> <ul style="list-style-type: none"> <li>✓ hypertension,</li> <li>✓ diabetes mellitus,</li> <li>✓ obesity</li> <li>✓ Causes and prevention through dietary/lifestyle modifications.</li> </ul> <p>Topic 5- National nutritional problem and strategy</p> <ul style="list-style-type: none"> <li>◆ Presentations/seminars by students on selected topics <ul style="list-style-type: none"> <li>✓ Social health problems: - smoking, alcoholism, drug dependence</li> <li>✓ Common ailments: - cold, cough, fevers, diarrhea, constipation</li> <li>✓ Causes and dietary treatment.</li> <li>✓ Food behavior and its impact on Nutrition and Health (culture, beliefs, and interdicts)</li> <li>✓ Rationale for the development of dietary guidelines</li> </ul> </li> </ul> |
| <p><b>Teaching strategy/methods:</b><br/> -The subject will be developed through extended lecture notes and theoretical exercises in which the syllabus topics will be reviewed, discussed and analyzed. Visits will be arranged to clinical nutrition and policy practicing activity like Hospital, NGO that works on Nutrition, and research laboratories.<br/> -Students will spend a significant amount of time in self-directed study, reading etc.<br/> - Some of the topics will be covered through group projects</p>  |

**Assessment criteria:**

- students should write 2 review papers on the state of Ethiopian Nutritional status and present it to the class
- Exam
- Presentation skills and attendance
- Field trip
- Group work

**The respective role of instructors and students:****Students**

- Attend sessions
- Carry out, present and discuss individual and group tasks
- Carry out reading assignments
- Reflect on feedbacks and take actions

**Instructors**

- Conduct block teaching
- Facilitate students individual and group activities
- Assess students' performance
- Provide timely feedback and make follow-up on resulting developments
- Plan and implements students consultation program

**Teaching support and inputs for each content:**

- Self-reading
- Visit of food industries
- Lecture notes
- Group projects and discussions

**Pre-requisite module code(s):** FSTH 331**Co-requisite module code (s):****Barred combination module (s):** None**Module requirements:** good writing and oral presentation skills, extensive reading.**Module calendar:** Semester II**Textbooks**

- Fellows, P. J. (2000). Food Processing Technology. 2nd edition. Cambridge: Woodheads Publishing
- Brennan, J. G. (2006). Food Processing Handbook. Willey-VCH.



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| <b>Course title: Food Packaging</b>   |
| <b>Module Code: FSTH 441</b>  |
| <b>Credit value of Module: 3 Cr. Hr</b>   |
| <p><b>Description of Module:</b><br/> This course covers major areas pertaining to food packaging materials and methods: materials, systems, and applications. The course equips students with theoretical and practical skills relating to principals of food packaging, types of packaging, special packaging methods (vacuum, gas and shrink packaging). It also dwells on function of a package, packaging materials, their structural qualities and performance including moisture and gas transmission, interaction of food and the packaging material, methods of package testing, performance evaluation and design of packaging systems for plant and animals products. The course also familiarize students with food packaging and law, shelf life testing, modern and traditional packaging material, physical and chemical properties, production, storage and recycling of packaging materials, regulation and equipment analysis of various existing packaging system and standards both national and international.</p> |
| <p><b>Learning outcomes:</b><br/> At the end of this lesson students are able to:</p> <ol style="list-style-type: none"> <li>1. Comfortably discuss packaging related issues such as materials selection, forming techniques and packaging sealing with a packaging engineer.</li> <li>2. Know how food packaging is manufactured.</li> <li>3. Understand the material properties of various packaging raw materials as well as the final package.</li> <li>4. Understand the principal methods of packaging foods as well as criteria for selecting and testing packaging materials.</li> <li>5. Familiarize themselves with packaging equipment and methods.</li> <li>6. Discuss recent advances in food packaging techniques and systems</li> </ol>  |
| <p><b>Content:</b><br/> Topic 1 - Packaging<br/> Topic 2 - Permeability characteristics of plastic packaging.<br/> Topic 3 - Interactions between packaging and foods<br/> Topic 4 - Filling and sealing of containers<br/> Topic 5 - Materials handling, storage and distribution<br/> Topic 6 - Packaging systems<br/> Topic 7 - Package closures and integrity<br/> Topic 8 - Environmental impacts of packaging</p>   |
| <p><b>Teaching strategy/methods:</b><br/> -Lecture notes<br/> -Small group interactive discussion<br/> -Case study<br/> -Assignments</p>  |
| <p><b>Assessment criteria:</b><br/> -critical review of selected published articles and presentation<br/> -Final Exam (case study type)</p>   |
| <b>The respective role of instructors and students:</b>   |

**Students**

Attend sessions

Carry out, present and discuss individual and group tasks

Carry out reading assignments

Reflect on feedbacks and take actions

**Instructors**

Conduct block teaching

Facilitate students individual and group activities

Assess students' performance

Provide timely feedback and make follow-up on resulting developments

Plan and implements students consultation program

**Teaching support and inputs for each content:**

- Self-reading
- Review up to date methodologies
- Lecture notes
- Group projects and discussions
- Critical review of published articles

**Pre-requisite module code(s): FSTH 311**

**Co-requisite module code (s):**

**Barred combination module (s):** None

**Module requirements:** good writing and oral presentation skills, extensive reading.

**Module calendar:**

Semester I

**Textbook (s):-**

- ◆ Soroka, Walter. 1995. Fundamentals of Food Packaging, Institute of Packaging Professionals, Herndon, Virginia.

**Reference (s):-**

- ◆ Paine F. and Paine, H. 1992. A Handbook of Food Packaging, Blackie Academic & Professional
- ◆ S. Natarajan, 2009. Fundamentals of Packaging Technology.

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| <b>Course title: Computational Methods in Food Formulation</b>  |
| <b>Module Code: FSTH 451</b>  |
| <b>Credit value of Module: 3 Cr. Hr</b>   |
| <p><b>Description of Module:</b><br/> This module covers the following themes:<br/> Introduction to computer and data accusation will be treated briefly. Basic methods of computation in food processing including component levels needed to achieve desired concentration, techniques for data fitting. Numerical and analytical differentiation and integration in analysis experimental data.</p>  |
| <p><b>Learning outcomes: after the completion of this module students will be to</b><br/> -Grasp concepts and practices underpinning the formulation of nutritious food<br/> -Acquire expertise in data entry and analysis<br/> -Develop basic statistical analysis skills<br/> -Be able to use statistical software such as SPSS, Stata, etc.</p>  |
| <p><b>Content:</b><br/> Topic 1-Basic concepts of Statistics<br/> Topic 2-Principles of experimental design and analysis<br/> Topic 3-Problems of food product design<br/> Topic 4-Single and multiple-factor (factorial) experiments<br/> Topic 5-Regression and correlation analysis<br/> Topic 6- Food process modeling and optimization<br/> Topic 7- Scientific writing</p>  |
| <p><b>Teaching strategy/methods:</b><br/> -The subject will be developed through extended lecture notes and theoretical exercises in which the syllabus topics will be reviewed, discussed and analyzed.<br/> -Students will be required to spend a significant amount of time in laboratories<br/> -Case studies, small projects to be presented in class</p>  |
| <p><b>Assessment criteria:</b><br/> <b>Examination will be based on:</b><br/> - Assignments<br/> - Presentations<br/> - written exam</p>  |
| <p><b>The respective role of instructors and students:</b><br/> <b>Students</b><br/> -Attend sessions<br/> -Carry out, present and discuss individual and group tasks<br/> -Carry out reading assignments<br/> -Reflect on feedbacks and take actions<br/> <b>Instructors</b><br/> -Conduct block teaching<br/> -Facilitate students individual and group activities<br/> -Assess students performance<br/> -Provide timely feedback and make follow-up on resulting developments<br/> -Plan and implements students consultation program</p> |
| <p><b>Teaching support and inputs for each content:</b><br/> - Laboratory work</p>  |

- Modular materials
- Reading materials (websites, journals, etc.)

**Pre-requisite module code(s): STAT 301**

**Co-requisite module code (s):**

**Barred combination module (s):** None

**Module requirements:** good computer skills.

**Module calendar:**

Semester II

**Textbook**

Sidel, J.L; Stone,H. (2004). *Sensory Evaluation Practices*. Elsevier.

**Reading materials**

Montgomery, D. (2001). *Design and Analysis of Experiments*. New York: John Wiley and Sons,Inc.

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| <b>Course title: Food Product Development</b>   |
| <b>Module Code: FSTH 461</b>  |
| <b>Credit value of Module: 3 Cr. Hr</b>   |
| <p><b>Description of Module:</b><br/> In this module covers developing new food products or adapting and improving existing ones. It dwells on principles and steps used in a new product-developing process; formulation, quality control, and commercial feasibility study. It also provides a unique experience to develop, strengthen and enhance rewarding opportunity, and challenge for students to integrate their training and learning in food science courses and related disciplines and gain experience in the theory and practice of developing food products that is expected to have an impact on student career development and lifelong learning. This course also creates an opportunity for students to be able to apply new trends in the creation of novel local food products which are able to be produced effectively, be able to be stored and delivered to consumers while maintaining their quality and safety.</p> |
| <p><b>Learning outcomes:</b><br/> At the end of this lesson students are able to:</p> <ol style="list-style-type: none"> <li>1. Understand and gain experience in the process of food product development</li> <li>2. Gain knowledge in food product ingredient technology.</li> <li>3. Be able to prepare a prototype for a new food product.</li> <li>4. Be able to identify challenges involved in the development of a new food product and how to find solutions.</li> <li>5. Understand techniques and knowledge related to the consumer product in development.</li> <li>6. Develop critical thinking skills related to food products.</li> <li>7. Help prepare the student for positions in the food industry</li> </ol>  |
| <p><b>Content:</b></p> <p><b>Topic 1. Introduction</b></p> <ul style="list-style-type: none"> <li>✓ Importance of product development</li> <li>✓ Food product life cycle</li> </ul> <p><b>Topic 2. New Product Development (NPD)</b></p> <ul style="list-style-type: none"> <li>✓ Forces (drives) for NPD</li> </ul> <p><b>Topic 3. Product development process</b></p> <ul style="list-style-type: none"> <li>✓ The product development team</li> <li>✓ The research and development process</li> </ul> <p style="margin-left: 40px;">Stage 1: product strategy</p> <p style="margin-left: 40px;">Stage 2: Product design and process development</p> <p style="margin-left: 40px;">Stage 3: Product commercialization</p> <p style="margin-left: 40px;">Stage 4: Product launch and evaluation</p>  |
| <p><b>Teaching strategy/methods:</b></p> <ul style="list-style-type: none"> <li>-Lecture notes</li> <li>-Small group interactive discussion</li> <li>-Case study</li> <li>-Assignments</li> </ul>   |
| <p><b>Assessment criteria:</b></p> <ul style="list-style-type: none"> <li>-critical review of selected published articles and presentation</li> <li>-Final Exam (case study type)</li> </ul>  |

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| <p><b>The respective role of instructors and students:</b></p> <p><b>Students</b><br/> Attend sessions<br/> Carry out, present and discuss individual and group tasks<br/> Carry out reading assignments<br/> Reflect on feedbacks and take actions</p> <p><b>Instructors</b><br/> Conduct block teaching<br/> Facilitate students individual and group activities<br/> Assess students performance<br/> Provide timely feedback and make follow-up on resulting developments<br/> Plan and implements students consultation program</p> |
| <p><b>Teaching support and inputs for each content:</b></p> <ul style="list-style-type: none"> <li>- Self-reading</li> <li>- Review up to date methodologies</li> <li>- Lecture notes</li> <li>- Group projects and discussions</li> <li>- Critical review of published articles</li> </ul>  |
| <p><b>Pre-requisite module code(s):</b> None</p>   |
| <p><b>Co-requisite module code (s):</b></p>  |
| <p><b>Barred combination module (s):</b> None</p>  |
| <p><b>Module requirements:</b> good writing and oral presentation skills, extensive reading.</p>   |
| <p><b>Module calendar:</b><br/> Semester I</p>   |
| <p><b>Textbook (s):-</b></p> <ul style="list-style-type: none"> <li>◆ Fuller, G.W. 2005. New Food Product Development, 2nd Edition. CRC Press, Boca Raton.</li> <li>◆ Resurreccion, A.V.A. 1998. Consumer sensory testing for product development. Aspen Publishing Inc. Ginthersburg, Maryland</li> </ul> <p><b>Reading Material (s)</b><br/> Earle, M., Earle, R., and Anderson, A. 2001. Food Product Development. CRC Press.</p>   |

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| <b>Course title: Drawing in Process Engineering</b>   |
| <b>Module Code: FSTH 412</b>  |
| <b>Credit value of Module: 3 Cr. Hr</b>   |
| <b>Description of Module:</b><br>This course introduces to the basic aspects of engineering designing, understanding how to sketch and design equipments, how to interpret processing and equipments, the role of designing in industrial process and designing for further research and development in science and technology.   |
| <b>Learning outcomes: after the completion of this module students will be to</b> <ol style="list-style-type: none"> <li>1. Describe the basic understanding of process in flow diagrams</li> <li>2. Explain the facts and variables involved in processing design</li> <li>3. Develop projects that courage and contribute food industries</li> </ol>  |
| <b>Content:</b><br>Topic 1 – Introduction to process engineering drawing<br>Topic 2 - Scales and Pictorial sketching Scales and Pictorial sketching<br>Topic 3 – Engineering curve and Theory<br>Topic 4 - Orthographic Projection  |
| <b>Teaching strategy/methods:</b><br>-The subject will be developed through extended lecture notes and practical exercises in which the syllabus topics will be reviewed, discussed and analyzed.<br>-Case studies, small projects to be presented in class   |
| <b>Assessment criteria:</b><br><b>Examination will be based on:</b><br>-Assignments<br>-Presentations<br>-written exam  |
| <b>The respective role of instructors and students:</b><br><b>Students</b><br>-Attend sessions<br>-Carry out, present and discuss individual and group tasks<br>-Carry out reading assignments<br>-Reflect on feedbacks and take actions<br><b>Instructors</b><br>-Facilitate students individual and group activities<br>-Assess students performance<br>-Provide timely feedback and make follow-up on resulting developments<br>-Plan and implements students consultation program |
| <b>Teaching support and inputs for each content:</b> <ul style="list-style-type: none"> <li>- Modular materials</li> <li>- Reading materials (websites, journals, etc.)</li> </ul>  |
| <b>Pre-requisite module code(s):</b> Math 201   |
| <b>Co-requisite module code (s):</b>  |
| <b>Barred combination module (s):</b> None  |
| <b>Module requirements:</b> good computer and Mathematics skills.   |
| <b>Module calendar:</b> Semester II   |
| <b>Textbook :</b> Maroulis B., Zekarias (2003). Food Process Design. Marcel Dekker, Inc , New York  |

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| <b>Course title: Food Safety and Sanitation</b>  |
| <b>Module Code: FSTH 422</b>   |
| <b>Credit value of Module: 3 Cr. Hr</b>  |
| <p><b>Description of Module:</b><br/> This course discusses and demonstrates microbial, chemical and biological safety of food, principles of sanitation for the food processing in the food industry. It provides an introduction to hygienic practices, requirements for sanitation programs and modern sanitation practices in food processing facilities. It also familiarizes students with international food safety management system such as Hazard Analysis and Critical Control Point system (HACCP) for food hygiene in a harmonized way, which may not vary with the country or food product concerned. Course instruction shall include case discussions and independent projects about safety issues in the food system from a multidisciplinary perspective.</p>  |
| <p><b>Learning outcomes: after the completion of this module students will be to</b></p> <ol style="list-style-type: none"> <li>1. Identify sanitation practices in food processing facilities</li> <li>2. Acquaint students with food safety hazards, assessment of risk, and evaluation.</li> <li>3. Understand the principles, actions, and limitations of food sanitation procedures.</li> <li>4. Equip students with current and future implications concerning food safety hazards and risks.</li> <li>5. Familiarizes students with international food safety management system such as Hazard Analysis and Critical Control Point system (HACCP)</li> <li>6. Explain sanitation principles and the requirements for a food sanitation program.</li> <li>7. Apply modern sanitation practices, including sanitation equipment and methods.</li> </ol> |
| <p><b>Content:</b></p> <ul style="list-style-type: none"> <li>Topic 1. Introduction</li> <li>Topic 2. Factors Contributing to Food Safety Concerns</li> <li>Topic 3. Food Borne Pathogens</li> <li>Topic 4. Chemicals Affecting Food Safety</li> <li>Topic 5. Food Safety strategies and control programs (GAP, GMP, GHP and HACCP)</li> </ul>   |
| <p><b>Teaching strategy/methods:</b></p> <ul style="list-style-type: none"> <li>-The subject will be developed through extended lecture notes and theoretical exercises in which the syllabus topics will be reviewed, discussed and analyzed.</li> <li>-Case studies, small projects to be presented in class</li> </ul>  |
| <p><b>Assessment criteria:</b><br/> <b>Examination will be based on:</b></p> <ul style="list-style-type: none"> <li>-Assignments</li> <li>-Presentations</li> <li>-written exam</li> </ul>   |
| <p><b>The respective role of instructors and students:</b></p> <p><b>Students</b></p> <ul style="list-style-type: none"> <li>-Attend sessions</li> <li>-Carry out, present and discuss individual and group tasks</li> <li>-Carry out reading assignments</li> <li>-Reflect on feedbacks and take actions</li> </ul> <p><b>Instructors</b></p> <ul style="list-style-type: none"> <li>-Conduct block teaching</li> </ul>   |



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| <ul style="list-style-type: none"> <li>-Facilitate students individual and group activities</li> <li>-Assess students' performance</li> <li>-Provide timely feedback and make follow-up on resulting developments</li> <li>-Plan and implements students consultation program</li> </ul> |
| <p><b>Teaching support and inputs for each content:</b></p> <ul style="list-style-type: none"> <li>- Laboratory work</li> <li>- Modular materials</li> <li>- Reading materials (websites, journals, etc.)</li> </ul>   |
| <p><b>Pre-requisite module code(s): FSTH 312 and FSTH 411</b></p>  |
| <p><b>Co-requisite module code (s):</b></p>  |
| <p><b>Barred combination module (s):</b> None</p>  |
| <p><b>Module requirements:</b> good computer skills.</p>   |
| <p><b>Module calendar:</b><br/>Semester II</p>   |
| <p><b>Textbook</b><br/>Marriott, N, Robert, B. 2006. Principles of Food Sanitation, 5th ed.</p>  |

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| <b>Course title: Food Industry Management</b>   |
| <b>Module Code: FSTH 432</b>  |
| <b>Credit value of Module: 4 Cr. Hr</b>   |
| <p><b>Description of Module:</b><br/> The course Food Industry Management provides undergraduate students with an educational foundation in the field of food distribution, marketing, and management. It includes the study of the overall competitive business marketplace of the food industry from a cross-industry perspective, consumer trends, trade relationships, supply and logistics issues, retailing and distribution, electronic commerce and an industry practicum. Food Industry Management prepares students to work in a variety of fields within the highly specialized and growing field of food industry. It will provide students with an understanding of the basic management concepts, resource management, and organizational management. It also equips the students with the management skills needed to meet the demands of the dynamic and competitive food industry.</p> |
| <p><b>Learning outcomes:</b><br/> After completion of this module, students will be able to grasp:</p> <ol style="list-style-type: none"> <li>1. Define the terms manager, management, and organization</li> <li>2. Have a critical understanding of the managerial functions in the food industry</li> <li>3. Be aware of the management trends, managerial roles and managerial skills.</li> <li>4. Develop a conceptual appreciation of the key concepts in the management such as planning, organizing, leading, and controlling.</li> <li>5. Have better understanding of information systems and application of information technology in the managerial issues.</li> <li>6. Discuss about food safety and quality management in the food industry</li> </ol>   |
| <p><b>Content:</b></p> <ul style="list-style-type: none"> <li>Topic 1: Concept of management and the manager</li> <li>Topic 2: Organizational management</li> <li>Topic 3: Resource management</li> <li>Topic 4: Managerial functions in the food industry</li> <li>Topic 5: Challenges in the management,</li> <li>Topic 6: Organizational environment of food industry</li> <li>Topic 7: Human resource management</li> <li>Topic 8: Information management</li> <li>Topic 9: Food safety and quality management in food industry.</li> </ul>   |
| <p><b>Teaching strategy/methods:</b></p> <ul style="list-style-type: none"> <li>-The subject will be developed through extended lecture notes and theoretical exercises in which the syllabus topics will be reviewed, discussed and analyzed. Visits will be arranged to research laboratories and food manufacturers to better identify the state and challenges of producing safe food.</li> <li>-Students will spend a significant amount of time in self-directed study, reading etc.</li> <li>- Some of the topics will be covered through group projects</li> </ul>  |
| <p><b>Assessment criteria:</b></p> <ul style="list-style-type: none"> <li>- Exam</li> <li>- Presentation skills and attendance</li> <li>- Field trip</li> <li>- Group work</li> </ul>   |

**The respective role of instructors and students:****Students**

Attend sessions  
Carry out, present and discuss individual and group tasks  
Carry out reading assignments  
Reflect on feedbacks and take actions

**Instructors**

Conduct block teaching  
Facilitate students individual and group activities  
Assess students' performance  
Provide timely feedback and make follow-up on resulting developments  
Plan and implements students consultation program

**Teaching support and inputs for each content:**

- Self-reading
- Visit of food industries
- Lecture notes
- Group projects and discussions

**Pre-requisite module code(s): none****Co-requisite module code (s):****Barred combination module (s): None****Module requirements:** good writing and oral presentation skills, extensive reading.**Module calendar:** Semester II**Textbook (s):**

- ◆ Leo Pyle and Kevan Leach , 2007. Food Industry Operations Control and Management.
- ◆ Marian C.Spears (3<sup>rd</sup> edition, 1991).Food Service Organizations: A managerial and System Approach.

**References:-**

- ◆ Chopra.S., Meindl P. (2008). Supply chain management. Strategy, planning, and operation. 3rd Ed[M]. Tsinghua University Press.
- ◆ Theuvsen, L, Spiller, A Peupert, M and Jahn, G. 2007. Quality management in food chains, Wageningen Academic Publishers.

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| <b>Course Title: Principles of Food Engineering</b>   |
| <b>Module Code: FSTH 442</b>  |
| <b>Credit value of Module: 4 Cr. Hr</b>   |
| <p><b>Description of Module:</b><br/> This course introduces students to principles and practices used in industry so that they can understand food engineering processes. The course equips students with a working knowledge of food engineering principles to enable them to solve design problems of food processing systems. It dwells on the application of engineering principles in the analysis of food process operations: material and energy balances, thermodynamics, fluid flow, heat transfer, mass transfer, and mechanics of materials. Unit operation in food engineering, mass and energy balance, fluid flow, fluid statics, fluid dynamics, fluid flow applications, heat transfer-modes of heat transfer, conduction, convection, and radiation, heat exchangers and their designs shall be discussed..</p> |
| <p><b>Learning outcomes:</b><br/> After completion of this module, students will be able to grasp:</p> <ol style="list-style-type: none"> <li>1. Gain knowledge of the principles and practices used in food industry so that they can understand food engineering processes</li> <li>2. Grasp fundamental principles for analysis of food processing systems</li> <li>3. Understand conservation of mass and energy as a basis in food engineering analysis</li> <li>4. Demonstrate an understanding of the concepts related to energy and mass balance</li> <li>5. Apply thermodynamics to evaluate the food processes</li> </ol>   |
| <p><b>Content:</b></p> <ul style="list-style-type: none"> <li>Topic 1: Basic principles of food process engineering</li> <li>Topic 2- Classifications of unit operations</li> <li>Topic 3- Heat Transfer Unit Operations</li> <li>Topic 4- Mass Transfer Unit Operations</li> <li>Topic 5: Mechanical Unit Operations</li> </ul>  |
| <p><b>Teaching strategy/methods:</b></p> <ul style="list-style-type: none"> <li>-The subject will be developed through extended lecture notes and theoretical exercises in which the syllabus topics will be reviewed, discussed and analyzed.</li> <li>-Students will spend a significant amount of time in self-directed study, reading etc.</li> <li>- Some of the topics will be covered through group projects</li> </ul>  |
| <p><b>Assessment criteria:</b></p> <ul style="list-style-type: none"> <li>-Assignments</li> <li>- Exam</li> <li>- Presentation skills and attendance</li> <li>- Group work</li> </ul>   |
| <p><b>The respective role of instructors and students:</b></p> <p><b>Students</b><br/> Attend sessions<br/> Carry out, present and discuss individual and group tasks<br/> Carry out reading assignments<br/> Reflect on feedbacks and take actions</p> <p><b>Instructors</b><br/> Conduct block teaching<br/> Facilitate students individual and group activities<br/> Assess students' performance</p>  |

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| Provide timely feedback and make follow-up on resulting developments<br>Plan and implements students consultation program  |
| <b>Teaching support and inputs for each content:</b> <ul style="list-style-type: none"> <li>- Self-reading</li> <li>- Lecture notes</li> <li>- Group projects and discussions</li> </ul>   |
| <b>Pre-requisite module code(s): FSTH 311 and FSTH 441</b>   |
| <b>Co-requisite module code (s):</b>   |
| <b>Barred combination module (s):</b> None   |
| <b>Module requirements:</b> good writing and oral presentation skills, extensive reading.  |
| <b>Module calendar:</b> Semester II  |
| <b>Textbooks</b> <ul style="list-style-type: none"> <li>◆ Batty, J.C. and Folkman, S.L. 1983. Food Engineering Fundamentals. John wiley and Sons, New York.</li> <li>◆ Brennan JG, Butter JR, Corell ND &amp; Lilly AVE. 1990. Food Engineering Operations, Elsevier.</li> </ul> |
| <b>Reference (s):-</b> <ul style="list-style-type: none"> <li>◆ Harper, J.C. 1975. Elements of Food Engineering. AVI, Westport.</li> </ul>   |

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| <b>Course title: Sensory Evaluation</b>  |
| <b>Module Code: FSTH 452</b>   |
| <b>Credit value of Module: 3 Cr. hr.</b>   |
| <p><b>Description of Module:</b><br/> The aim of this module is to provide the basic principles in measuring color, texture and flavor of foods by sensory and instrumental methods. Advanced statistical analysis of relation of colorimetric, textuometry, and chemistry of volatile compounds to perception of appearance, texture and flavor.</p>  |
| <p><b>Learning outcomes:</b><br/> At the end of this module, the student will be able:<br/> -Explain the use of sensory evaluation for new product development<br/> -familiarize with the various sensory evaluation techniques<br/> -To conduct a sensory study<br/> -Appreciate how sensory attributes are perceived by human sense organs and how this influence product acceptability and market</p>   |
| <p><b>Content:</b><br/> Topic 1- Development of sensory evaluation<br/> Topic 2- The chain of sensory perceptions: Basic Sensory organs<br/> Topic 3- Sensory attributes and the way they are perceived: aroma, color, flavor, texture; the human senses<br/> Topic 4- Sensory evaluation techniques: discriminative and descriptive tests such as triangle test, paired comparison tests, etc.<br/> Topic 5- Conducting a sensory study: control of test room, product and panel</p>  |
| <p><b>Teaching strategy/methods:</b><br/> Teaching will be in the form of interactive lectures, assignments, and oral presentations on selected topics.</p>  |
| <p><b>Assessment criteria:</b><br/> Presentation on selected topics<br/> Sensory laboratory<br/> Final Exam</p>  |
| <p><b>The respective role of instructors and students:</b></p> <p><b>Students</b><br/> Attend sessions<br/> Carry out, present and discuss individual and group tasks<br/> Carry out reading assignments<br/> Reflect on feedbacks and take actions</p> <p><b>Instructors</b><br/> Conduct block teaching<br/> Facilitate students individual and group activities<br/> Assess students performance<br/> Provide timely feedback and make follow-up on resulting developments<br/> Plan and implements students consultation program</p> |
| <p><b>Teaching support and inputs for each content:</b></p> <ul style="list-style-type: none"> <li>- Self-reading</li> <li>- Lecture notes</li> <li>- Group projects and discussions</li> </ul>  |

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| - Critical review of published articles   |
| <b>Pre-requisite module code(s):</b> FSTH 451 & FSTH 431  |
| <b>Co-requisite module code (s):</b>  |
| <b>Barred combination module (s):</b> None  |
| <b>Module requirements:</b> good writing and oral presentation skills, extensive reading.   |
| <b>Module calendar:</b><br>Semester III   |
| <b>Textbook</b><br>Sidel, J.L.; Stone,H. (2004). <i>Sensory Evaluation Practices</i> . Elsevier.  |
| <b>Reading materials</b><br>Carpenter R.P.; Lyon D.H.; Hasdell T.A(2000). <i>Guidelines for sensory analysis in food product development and quality control-2<sup>nd</sup> ed.</i> ASPEN |

**Course title: Food Marketing and World issues**

**Module Code: FSTH 511**

**Credit value of Module: 3 Cr. Hr**

**Description of Module:**

The course equips students with a range of theoretical and practical skills and a broad understanding of management and marketing in the food industries. It will provide students with an understanding of the food supply chain and the management skills needed to meet the demands of the dynamic and competitive food industry. It will also enable students develop an understanding of the food supply chain from field to fork, examining a wide range of topics including food production, procurement, quality management, marketing, operations and people management. The combination of technical and business skills that underpin the course provides students with the foundations for the development of a career in the food chain in Ethiopia or even internationally. Topics will include strategic supply chain management, managing demand, food manufacturing and organizational resilience, procurement and outsourcing, collaboration and partnerships, food logistics, tools for supply chain improvement, warehousing, distribution, storage and packaging operations.

**Learning outcomes:**

After completion of this module, students will be able to grasp:

1. Demonstrate an awareness of the role of supply chain management in competitive strategy in the food industry
2. Have a critical understanding of the buyer-supplier relationship debate
3. Be aware of the challenges involved in identifying, acquiring and managing the various resources required in food supply chains
4. Develop a conceptual appreciation of the key supply chain management processes and their role in satisfying customer demands
5. Follow a process of continuous improvement and have awareness of the main tools and techniques that can help improve food supply chain processes
6. Have the language required to discuss the use of sophisticated supply chain management techniques with functional experts

**Content:**

- Topic 1- The Role of Fundamentals of Agricultural of food marketing
- Topic 2- Malnutrition and diminishing food supply
- Topic 3- Macroeconomic policy , Poverty, Hunger and Food shortages
- Topic 4- Ethiopian's food security challenges and efforts
- Topic 5- Agricultural value , supply chains and its analysis
- Topic 6- Food marketing research

**Teaching strategy/methods:**

- The subject will be developed through extended lecture notes and theoretical exercises in which the syllabus topics will be reviewed, discussed and analyzed.
- Students will spend a significant amount of time in self-directed study, reading etc.
- Some of the topics will be covered through group projects

**Assessment criteria:**

- Exam
- Presentation skills and attendance



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| <ul style="list-style-type: none"> <li>- Field trip</li> <li>- Group work</li> </ul>  |
| <p><b>The respective role of instructors and students:</b></p> <p><b>Students</b><br/> Attend sessions<br/> Carry out, present and discuss individual and group tasks<br/> Carry out reading assignments<br/> Reflect on feedbacks and take actions</p> <p><b>Instructors</b><br/> Conduct block teaching<br/> Facilitate students individual and group activities<br/> Assess students' performance<br/> Provide timely feedback and make follow-up on resulting developments<br/> Plan and implements students consultation program</p>   |
| <p><b>Teaching support and inputs for each content:</b></p> <ul style="list-style-type: none"> <li>- Self-reading</li> <li>- Visit of food industries</li> <li>- Lecture notes</li> <li>- Group projects and discussions</li> </ul>   |
| <p><b>Pre-requisite module code(s): FSTH 461 &amp; MEAN-211</b></p>   |
| <p><b>Co-requisite module code (s):</b></p>   |
| <p><b>Barred combination module (s): None</b></p>   |
| <p><b>Module requirements:</b> good writing and oral presentation skills, extensive reading.</p>  |
| <p><b>Module calendar:</b> Semester II</p>  |
| <p><b>Textbook</b></p> <ul style="list-style-type: none"> <li>◆ Fawcett, S.E., Ellram, L.M., &amp; Ogden, J.A. 2007. Supply chain management: From vision to implementation. Pearson education Asia Ltd and Tsinghua University Press.</li> <li>◆ Chopra.S., Meindl P. (2008). Supply chain management. Strategy, planning, and operation. 3rd Ed[M]. Tsinghua University Press.</li> </ul> <p><b>References</b></p> <ul style="list-style-type: none"> <li>◆ Theuvsen, L, Spiller, A Peupert, M and Jahn, G. 2007. Quality management in food chains, Wageningen Academic Publishers.</li> <li>◆ Kohls, R.L. and Uhl, J.N. (1990) Marketing of Agricultural Products, 6th edition, New York, Macmillan Publishing Company pp. 18–21.</li> <li>◆ Kotler, P. (1988), Marketing Management: Analysis, Planning,</li> <li>◆ borough, V. and Kydd, J. (1992), Economic Analysis Of Agricultural MarImplementation and Control, Prentice-Hall, New Jersey, p.16</li> <li>◆ Scott, G. 1995. Prices, Products, People: Analyzing Agricultural Markets in Developing Countries.</li> <li>◆ Scarkets: A Manual. Chatham, UK, Natural Resource Institute, p. 140</li> </ul> |

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| <b>Course title: Fermentation Technology</b>  |
| <b>Module Code: FSTH 521</b>  |
| <b>Credit value of Module: 3 Cr. Hr</b>   |
| <p><b>Description of Module:</b><br/>         Fermentation technology emphasizes microbial growth kinetics, media for industrial fermentation, and development of inocula for industrial fermentation. It also delves into the design of fermenter, instrumentation and control for fermentation, aeration and agitation, recovery and purification of fermentation products. Other topics covered in this course are fermentation economics, maintenance of fermenter, principle of biological fermentation process; submerged fermentation; solid state fermentation; disinfection of the equipment; factors affecting the process; raw material for fermentation ... etc.</p>  |
| <p><b>Learning outcomes:</b><br/>         After completion of this module, students will be able to grasp:</p> <ol style="list-style-type: none"> <li>1. Identity, characteristics, and sources of microorganisms in food fermentations.</li> <li>2. Describe metabolic activities of microorganisms and their influence on product attributes.</li> <li>3. Understand the interactions between microorganisms.</li> <li>4. Explain processing of fermented foods.</li> <li>5. Describe growth, maintenance, and preservation of microbial starter cultures.</li> <li>6. Explain problems that may arise during fermentations and solutions.</li> <li>7. Understand the whole process of fermentation; starting from media design down to downstream processing.</li> </ol> |
| <p><b>Content:</b><br/>         Topic 1- Introduction to fermentation<br/>         Topic 2- Food Fermentation Technology<br/>         Topic 3- Microbiology of Fermentation<br/>         Topic 4- Bioreactors of fermentation<br/>         Topic 5- Fermented Food Products<br/>         Topic 6- Fermentation technology for Food Industry waste treatment and utilization<br/>         Topic 7-Production of Single Cell Proteins</p>   |
| <p><b>Teaching strategy/methods:</b><br/>         -The subject will be developed through extended lecture notes and theoretical exercises in which the syllabus topics will be reviewed, discussed and analyzed.<br/>         -Students will spend a significant amount of time in self-directed study, reading etc.<br/>         - Some of the topics will be covered through group projects</p>   |
| <p><b>Assessment criteria:</b><br/>         - Exam<br/>         - Presentation skills and attendance<br/>         - Field trip<br/>         - Group work</p>  |
| <p><b>The respective role of instructors and students:</b></p> <p><b>Students</b><br/>         Attend sessions<br/>         Carry out, present and discuss individual and group tasks<br/>         Carry out reading assignments<br/>         Reflect on feedbacks and take actions</p> <p><b>Instructors</b></p>   |

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| <p>Conduct block teaching<br/> Facilitate students individual and group activities<br/> Assess students' performance<br/> Provide timely feedback and make follow-up on resulting developments<br/> Plan and implements students consultation program</p>   |
| <p><b>Teaching support and inputs for each content:</b></p> <ul style="list-style-type: none"> <li>- Self-reading</li> <li>- Visit of food industries</li> <li>- Lecture notes</li> <li>- Group projects and discussions</li> </ul>   |
| <p><b>Pre-requisite module code(s):</b> FSTH 211</p>  |
| <p><b>Co-requisite module code (s):</b></p>   |
| <p><b>Barred combination module (s):</b> None</p>   |
| <p><b>Module requirements:</b> good writing and oral presentation skills, extensive reading.</p>  |
| <p><b>Module calendar:</b> Semester II</p>  |
| <p><b>Text Books</b></p> <ul style="list-style-type: none"> <li>◆ Stanbury, P.F., Whitaker, A and Hall, S. 1999. Principle of fermentation technology. USA. Academic Press.</li> </ul> <p><b>Reading Materials</b></p> <ul style="list-style-type: none"> <li>◆ Kosikowski, F.V. 1997. Cheese and fermented milk foods. Frank Kosikowski and Vikram Mistry, Brooktondale, N. Y.</li> <li>◆ Steinkraus, K.H. 1983. Handbook of Indigenous Fermented Foods. Marcel Dekker, New York.</li> </ul> |

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| <b>Course title: Cereal and Legume Technology</b>   |
| <b>Module Code: FSTH 541</b>  |
| <b>Credit value of Module: 3 Cr. Hr</b>   |
| <p><b>Description of Module:</b><br/> General introduction to cereals, new varieties, production trends of wheat, rice, barley, oat, corn, sorghum, <i>Teff and</i> millets in Ethiopia. Structure and nutrient distribution in cereals, wheat types, milling of wheat, quality of flour and flour treatment, technology of bread, biscuits, cakes, wheat and pasta products. Chemical constituents, processing, and malting of barley. Corn-wetland dry milling, corn flakes, starch, its derivatives. Wheat starch processing, modification and utilization, development of wheat based extruded products. Moreover, legume processing (canned and various snack foods, soybean processing and its various products)</p>  |
| <p><b>Learning outcomes:</b><br/> After completion of this module, students will be able to grasp:</p> <ol style="list-style-type: none"> <li>1. Understand the new varieties of the production trends of a host of cereals and legumes</li> <li>2. Familiarized themselves with the modern dry and wet milling methods of cereals and legumes</li> <li>3. Equip them with working of milling equipment, composite and alternate flours.</li> <li>4. Understand wheat starch processing, modification and utilization, development of wheat based extruded products.</li> <li>5. Equips students with the latest quality evaluation methods for pulses/legumes, milling methods, working of machinery and equipment employed in pulses processing, and also understand losses during milling and their control as well as the utilization trend of pulses in Ethiopia and abroad</li> <li>6. Examine the working of milling equipment, production and utilization of corn starch derivatives; equipment used in the milling of cereals, nutritional products and their recovery in cereals, recent utilization trends in cereals as well as the latest quality evaluation methods cereal grains</li> <li>7. Equips them with legume processing (canned and various snack foods and its various product).</li> </ol> |
| <p><b>Content:</b><br/> Topic 1- Introduction to cereals<br/> Topic 2- Grain grading/ quality assessment and pre-processing<br/> Topic 3- Malting<br/> Topic 4- Rheology of dough and batters<br/> Topic 5- Yeast leavened products<br/> Topic 6: Soft wheat products<br/> Topic 7: Pasta and noodles technology<br/> Topic 8: Ready-to-eat breakfast cereals<br/> Topic 9: Structure, composition and processing of some selected legumes(soy bean, beans etc)</p>   |
| <p><b>Teaching strategy/methods:</b><br/> -The subject will be developed through extended lecture notes and theoretical exercises in which the syllabus topics will be reviewed, discussed and analyzed.<br/> -Students will spend a significant amount of time in self-directed study, reading etc.<br/> - Some of the topics will be covered through group projects</p>   |

**Assessment criteria:**

- Exam
- Presentation skills and attendance
- Group work

**The respective role of instructors and students:****Students**

- Attend sessions
- Carry out, present and discuss individual and group tasks
- Carry out reading assignments
- Reflect on feedbacks and take actions

**Instructors**

- Conduct block teaching
- Facilitate students individual and group activities
- Assess students' performance
- Provide timely feedback and make follow-up on resulting developments
- Plan and implements students consultation program

**Teaching support and inputs for each content:**

- Self-reading
- Visit of food industries
- Lecture notes
- Group projects and discussions

**Pre-requisite module code(s): FSTH 311 and FSTH 442****Co-requisite module code (s):****Barred combination module (s):** None**Module requirements:** good writing and oral presentation skills, extensive reading.**Module calendar:** Semester II**Textbook**

- ◆ *Kent, N.L. and Evans, A.D. 1997. The Technology of Cereals.*

**Reference**

- ◆ *Kulp, Karel and Pante, Joseph 2000. Handbook of Cereal Science and Technology*  
Mercel. Dekkar USA.
- ◆ *Matz, S. 1991. The Chemistry and Technology of Cereals as Food and Feed.* Pan-Tech  
International
- ◆ *Riaz M. N. 2006. Soy Applications in Food.* Taylor and Francis Publishing.

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| <b>Course title: Fruit and Vegetable Technology</b>   |
| <b>Module Code: FSTH 551</b>  |
| <b>Credit value of Module: 3 Cr. Hr</b>   |
| <p><b>Description of Module:</b><br/> Fruits and vegetables are essential to the human diet, providing sources of fiber, vitamins, and many medicinal compounds such as the anti-cancer compounds. This course therefore discusses principles and methods of fruit and vegetable preservation, composition and related quality factors for processing, principles of storage of fruits and vegetables. It also acquaints students with types of storage: natural, ventilated low temperature storage, modified atmosphere storages etc. Moreover, it dwells on preservation of fruits and vegetables by heat, chemicals, sugar, salt, fermentation, drying ... etc. Canning of fruits and vegetables, tin cans, glass containers seaming technology, aseptic canning technology will also be discussed. Fruit and vegetable juices, preparation of syrups, cordials and nectars, juice concentrates, pectin and related compounds, jams, jellies, marmalades, preserves will also be dealt with. Additionally, the course will equip students with the theory of gel formation, quality control, pickles, chutneys and vinegar production, tomato products, drying and dehydration of fruits and vegetables, problems related to storage of dehydrated products, freezing and freeze-drying of food and frozen products, fruit product order and quality control.</p> |
| <p><b>Learning outcomes:</b><br/> After completion of this module, students will be able to grasp:</p> <ol style="list-style-type: none"> <li>1. Familiarize them with equipment for fruits and vegetable processing, plant-layout, can seaming operation, preparation of fruit juices, squashes, syrups and ready-to-serve beverages</li> <li>2. Gain knowledge of principles and methods of fruit and vegetable preservation and principle and techniques of storage of fruits and vegetables.</li> <li>3. Master the techniques and technology of post-harvest handling of fresh fruits and vegetables</li> <li>4. Gain knowledge of fruits and vegetables preservation and storage</li> <li>5. Equip themselves with techniques of dehydration of fruits and vegetables including packaging, storage, quality control before and after dehydration</li> <li>6. Understand application of packaging and Modified Atmosphere (MA) to fresh-cut fruits and vegetables, storage and handling of fresh produce</li> </ol>  |
| <p><b>Content:</b><br/> Topic 1- Composition and Nutritional values of Fruits ad Vegetables<br/> Topic 2- Physiology of Ripening of Fruits and Vegetables<br/> Topic 3- Post harvest handling of fruits and vegetables<br/> Topic 4- Processing of Fruits and Vegetables</p>  |
| <p><b>Teaching strategy/methods:</b><br/> -The subject will be developed through extended lecture notes and theoretical exercises in which the syllabus topics will be reviewed, discussed and analyzed. -Students will spend a significant amount of time in self-directed study, reading etc.<br/> - Some of the topics will be covered through group projects</p>  |
| <p><b>Assessment criteria:</b><br/> - Exam<br/> - Presentation skills and attendance</p>  |

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| <ul style="list-style-type: none"> <li>- Field trip</li> <li>- Group work</li> </ul>  |
| <p><b>The respective role of instructors and students:</b></p> <p><b>Students</b><br/> Attend sessions<br/> Carry out, present and discuss individual and group tasks<br/> Carry out reading assignments<br/> Reflect on feedbacks and take actions</p> <p><b>Instructors</b><br/> Conduct block teaching<br/> Facilitate students individual and group activities<br/> Assess students' performance<br/> Provide timely feedback and make follow-up on resulting developments<br/> Plan and implements students consultation program</p>   |
| <p><b>Teaching support and inputs for each content:</b></p> <ul style="list-style-type: none"> <li>- Self-reading</li> <li>- Visit of food industries</li> <li>- Lecture notes</li> <li>- Group projects and discussions</li> </ul>   |
| <p><b>Pre-requisite module code(s):</b> FSTH 311 &amp; FSTH 312</p>   |
| <p><b>Co-requisite module code (s):</b></p>   |
| <p><b>Barred combination module (s):</b> None</p>   |
| <p><b>Module requirements:</b> good writing and oral presentation skills, extensive reading.</p>  |
| <p><b>Module calendar:</b> Semester II</p>  |
| <p><b>Textbook</b></p> <ul style="list-style-type: none"> <li>◆ Swiader, J.M. Ware, G.W. and McCollum, J.P.. 2002. Producing Vegetable Crops. Interstate Publishers. Danville, Illinois.</li> <li>◆ Woodruf, J and Luh, B. 1986. <i>Commercial Fruit Processing</i>. 2nd ed. AVI Publishing, Wesport, CT.</li> </ul> <p><b>References</b></p> <ul style="list-style-type: none"> <li>◆ Childers, N.F. J.R. Morris, G.S. Sibbet. 1995. Modern Fruit Science. Horticultural Publications. Gainesville, Florida.</li> <li>◆ Lewis and Elvin-Lewis. 1977. Medical Botany: plants affecting man's health. John Wiley and Sons, NY</li> </ul> |

**Course title: Meat, Fish and Poultry Products Technology**

**Module Code: FSTH 561**

**Credit value of Module: 3 Cr. Hr**

**Description of Module:**

This course shall discuss sources of meat and meat products in Ethiopia, and its significance in national economy. It will also familiarize students with chemical composition and microscopic structure of meat. It will make an in depth examination of the effect of feed, breed and management on meat production and quality; slaughtering of animals and poultry, inspection and grading of meat. It will also look into factors affecting post-mortem changes, properties and shelf-life of meat; meat quality evaluation; mechanical deboning, meat tenderization; aging, pickling and smoking of meat; meat plant sanitation and safety as well as byproduct utilization; and recent trends in meat processing. Moreover, it will discuss the structure, composition, nutritive value and functional properties of eggs and its preservation by different methods; factors affecting egg quality and measures of egg quality. Types of fish, composition, structure, post-mortem changes in fish; handling of fresh water fish; canning, smoking, freezing and dehydration of fish; fish sausage and home making will also be dealt with. Students will also equip themselves with slaughtering and dressing of meat animals, study of post-mortem changes, meat cutting and handling, evaluation of meat quality; experiments in dehydration, freezing, canning, curing, smoking and pickling of fish and meat; shelf-life studies on processed meat products, evaluation of quality and grading of eggs, preservation of shell eggs, estimation of meat: bone ratios, preparation of meat products, canned, dehydrated, barbecued sausages, ... etc

**Learning outcomes:**

After completion of this module, students will be able to grasp:

1. Familiarize students with the nutritional and economical/social importance of meat, poultry with projections on production of meat poultry and fish in Ethiopia
2. Understand the importance of the slaughter house and meat inspection in providing wholesome safe meats for human consumption.
3. Gain knowledge of the underlying physiological and structural components for conversion of meat to human food.
4. Understand factors affecting meat palatability and meat type identification as well as poultry slaughter and processing
5. Gain an understanding of the chemical and physical characteristics of fish
6. Apply scientific and business principles to manufacturing and process flow of commercial meat products and demonstrating knowledge of these principles through processing of meat products.
7. Understand different methods and techniques of meat , poultry and fish preservation and storage
8. Gain knowledge and techniques of meat, poultry and fish by-products.

**Content:**

- Topic 1- General overview of meat based products
- Topic 2- Slaughtering and Grading
- Topic 3- Processing, Preservation and Storage of Meat
- Topic 4- Meat Curing and Smoking
- Topic 5- Poultry Processing Technology



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| <p>Topic 6- Eggs Processing Technology<br/>Topic 7: Fish Processing Technology</p>  |
| <p><b>Teaching strategy/methods:</b><br/>-The subject will be developed through extended lecture notes and theoretical exercises in which the syllabus topics will be reviewed, discussed and analyzed.<br/>-Students will spend a significant amount of time in self-directed study, reading etc.</p>  |
| <p><b>Assessment criteria:</b><br/>- Exam<br/>- Presentation skills and attendance<br/>- Group work</p>   |
| <p><b>The respective role of instructors and students:</b><br/><b>Students</b><br/>Attend sessions<br/>Carry out, present and discuss individual and group tasks<br/>Carry out reading assignments<br/>Reflect on feedbacks and take actions<br/><b>Instructors</b><br/>Facilitate students individual and group activities<br/>Assess students' performance<br/>Provide timely feedback and make follow-up on resulting developments<br/>Plan and implements students consultation program</p> |
| <p><b>Teaching support and inputs for each content:</b><br/>- Self-reading<br/>- Lecture notes<br/>- Group projects and discussions</p>   |
| <p><b>Pre-requisite module code(s): FSTH 311 &amp; FSTH 442</b></p>   |
| <p><b>Co-requisite module code (s):</b></p>   |
| <p><b>Barred combination module (s): None</b></p>   |
| <p><b>Module requirements:</b> good writing and oral presentation skills, extensive reading.</p>  |
| <p><b>Module calendar:</b> Semester II</p>  |
| <p><b>Textbook</b><br/>◆ Kisman, D., Koyula, A., Breidenstein, B.C. 1994. Muscle Foods. Chapman &amp; Hall, Inc. Newyork.<br/><b>References</b><br/>◆ Pearson, A. and Tauber, F. 1984. Processed meat. Van Nostrand Reihold Company. New York.<br/>◆ Forest, J. Fundamentals of Meat Science. 1983.</p>   |

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| <b>Course title: Internship</b>   |
| <b>Module Code: FSTH 571</b>  |
| <b>Credit value of Module: 3 Cr. Hr</b>   |
| <p><b>Description of Module:</b><br/>         Internship program in Food Science at Hope College will take place after a series of six semesters of study. It will enable students to get experience related to their field of study, students will receive academic credit of six hours. Interns will return to campus with a better understanding of how their course work relates to the real world and with a clearer picture of their career goals. Students also see how a specific industry or organization they are interested in actually works, and they return to the College more motivated to excel in the field. Typically, an intern will be assigned to a project and will be expected to prepare and present a written report at the end of the internship.</p> <p>Not only does the internship program provide valuable experience, but it can as well be a direct pathway to that first job.</p> |
| <p><b>Learning outcomes:</b><br/>         After completion of this module, students will be able to grasp:</p> <ul style="list-style-type: none"> <li>• Obtain practical experience in their field of study.</li> <li>• It provides an opportunity to establish contacts with employers for possible job interviews following graduation</li> <li>• Initiate ideas of founding Small and Medium Enterprises (SME) by the B.Sc. graduates.</li> <li>• The industrial internship provides a contextual learning environment that validates a curriculum of study and networks the student for future career employment.</li> <li>• In addition, the undergraduate internship is a program of education that formally integrates the student's academic study with work experience in cooperating organizations.</li> </ul>  |
| <p><b>Teaching strategy/methods:</b><br/>         On job training<br/>         Monitoring<br/>         Discussions<br/>         Brainstorming</p>   |
| <p><b>Assessment criteria:</b><br/>         Report<br/>         Presentation<br/>         Case study project<br/>         Employer feedback</p>   |
| <b>Pre-requisite module code(s): Complete Six semester courses</b>  |

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| <b>Course title: Fats and Oils Processing Technology</b>   |
| <b>Module Code: FSTH 512</b>   |
| <b>Credit value of Module: 3 Cr. Hr</b>  |
| <p><b>Description of Module:</b><br/> This course shall discuss the importance of oil seeds processing as well as the potential sources of commercial edible oil. It will examine the composition and processing of oilseeds as protein concentrates, properties and uses of oilseed meals, technology, vegetable protein isolates; barrier compounds in the utilization of low cost protein foods from oilseeds. The course also will delve into refining of crude oil- degumming, bleaching, deodorization; preparation of protein concentrates and isolates and their use in high protein foods; margarine-manufacturing and uses of margarine, and confectionery coatings. It will also familiarize students with imitation dairy products - peanut butter and vegetable ghee. Packing and storage of fats and oils, cocoa butter, fat substitutes and low-calorie foods will also be discussed.</p> |
| <p><b>Learning outcomes:</b><br/> After completion of this module, students will be able to grasp:</p> <ol style="list-style-type: none"> <li>1. Equip them with requisite conceptual insight, skill and knowledge of oilseeds technology to enable them provide entrepreneurial inputs in growing food industry in Ethiopia.</li> <li>2. Equip them with the practical and theoretical principles of the process of seed preparation, oil extraction, and its impact on downstream protein products and oil quality</li> <li>3. Gain knowledge of the improved and emerging oilseeds technologies</li> <li>4. Understand the modern processing technology to increase the output and improve the safety and quality of oil.</li> <li>5. Gain skills and knowledge about the composition and processing of oilseeds as protein</li> </ol>  |
| <p><b>Content:</b></p> <ul style="list-style-type: none"> <li>Topic 1- Sources, chemistry and functions of oils and Fats</li> <li>Topic 2- Handling, Storage and Preparation of Oil seeds</li> <li>Topic 3- Extraction of Oils and Fats</li> <li>Topic 4- Refining</li> <li>Topic 5- Modifications and Products of Fats and Oils</li> </ul>  |
| <p><b>Teaching strategy/methods:</b></p> <ul style="list-style-type: none"> <li>-The subject will be developed through extended lecture notes and theoretical exercises in which the syllabus topics will be reviewed, discussed and analyzed. Visits will be arranged to observe how oils are processed in oil industries.</li> <li>-Students will spend a significant amount of time in self-directed study, reading etc.</li> <li>- Some of the topics will be covered through group projects</li> </ul>  |
| <p><b>Assessment criteria:</b></p> <ul style="list-style-type: none"> <li>- Exam</li> <li>- Presentation skills and attendance</li> <li>- Field trip to oil processing factory</li> <li>- Group work</li> </ul>  |
| <p><b>The respective role of instructors and students:</b></p> <p><b>Students</b><br/> Attend sessions<br/> Carry out, present and discuss individual and group tasks</p>  |

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| <p>Carry out reading assignments<br/>         Reflect on feedbacks and take actions</p> <p><b>Instructors</b><br/>         Conduct block teaching<br/>         Facilitate students individual and group activities<br/>         Assess students' performance<br/>         Provide timely feedback and make follow-up on resulting developments<br/>         Plan and implements students consultation program</p> |
| <p><b>Teaching support and inputs for each content:</b></p> <ul style="list-style-type: none"> <li>- Self-reading</li> <li>- Visit of food industries</li> <li>- Lecture notes</li> <li>- Group projects and discussions</li> </ul>   |
| <p><b>Pre-requisite module code(s): FSTH 411 &amp; 442</b></p>  |
| <p><b>Co-requisite module code (s):</b></p>   |
| <p><b>Barred combination module (s):</b> None</p>   |
| <p><b>Module requirements:</b> good writing and oral presentation skills, extensive reading.</p>  |
| <p><b>Module calendar:</b> Semester II</p>  |
| <p><b>Textbook (s):-</b></p> <ul style="list-style-type: none"> <li>◆ Hamilton, R.J. and Bharti, A. Ed. 1980. Fats and Oils: Chemistry and Technology. Applied Science, London.</li> </ul> <p><b>Reference:-</b></p> <ul style="list-style-type: none"> <li>◆ Salunkhe, O.K. Chavan, J.K, Adsule, R.N. and Kadam, S.S. 1992. World Oilseeds: Chemistry, Technology and Utilization. VNR, New York.</li> </ul>     |

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| <b>Course title: Food Biotechnology</b>   |
| <b>Module Code: FSTH 522</b>  |
| <b>Credit value of Module: 3 Cr. Hr</b>   |
| <p><b>Description of Module:</b><br/> This course discusses the history and development of biotechnology, and application of genetics to food production. Students will be familiarized with methods of molecular cloning, immobilization of microbial and cultured plant cells, principles of downstream processing, small, medium and large scale processing, bacterial starter culture, methods of inoculums, and medium preparation, slurry processing and product isolation. Moreover, technological aspects of industrial production of enzymes amylase, proteases, organic acids, amino acids, vitamins, antibiotics, baker's yeast, and single cell protein will also be examined. Fermented food: origin, scope and development, sauerkraut, yoghurt, cheese, etc. will also be dealt with. It will also delve into regulatory and social aspects of biotechnology of foods, application of enzymes in food industry, production of food flavor, color, enzymes, immobilized enzymes.</p>                  |
| <p><b>Learning outcomes:</b><br/> After completion of this module, students will be able to grasp:</p> <ol style="list-style-type: none"> <li>1. Define the relevant concepts of biotechnology applicable to the food sector</li> <li>2. Describe and explain the fundamentals of molecular biology in relation to gene expression and manipulation.</li> <li>3. Identify the biochemical components of food and apply the important uses of enzymes in the food industry</li> <li>4. Investigate and apply methods for biochemical analysis of foods.</li> <li>5. Apply the techniques for producing genetically modified foods and the functions of the introduced gene(s).</li> <li>6. Critically analyze the ethical and legal issues pertaining to the production, commercialization and utilization of GM foods.</li> <li>7. Demonstrate skills for the identification and control of microbial and other food contaminants</li> <li>8. Contribute to ensure quality and safety in food production</li> </ol> |
| <p><b>Content:</b><br/> Topic 1- Introduction to Biotechnology<br/> Topic 2- Biotechnology based food production and processing<br/> Topic 3- Application of enzymes Foods and Processing<br/> Topic 4- Downstream processing in biotechnology<br/> Topic 5- Genetically Modifies Foods (GMOs)</p>  |
| <p><b>Teaching strategy/methods:</b><br/> -The subject will be developed through extended lecture notes and theoretical exercises in which the syllabus topics will be reviewed, discussed and analyzed.<br/> -Students will spend a significant amount of time in self-directed study, reading etc.<br/> - Some of the topics will be covered through group projects</p>   |
| <p><b>Assessment criteria:</b><br/> - Exam<br/> - Presentation skills and attendance<br/> - Group work</p>  |
| <b>The respective role of instructors and students:</b>   |

**Students**

Attend sessions

Carry out, present and discuss individual and group tasks

Carry out reading assignments

Reflect on feedbacks and take actions

**Instructors**

Conduct block teaching

Facilitate students individual and group activities

Assess students' performance

Provide timely feedback and make follow-up on resulting developments

Plan and implements students consultation program

**Teaching support and inputs for each content:**

- Self-reading
- Visit of food industries
- Lecture notes
- Group projects and discussions

**Pre-requisite module code(s): FSTH 521 & FSTH 442**

**Co-requisite module code (s):**

**Barred combination module (s):** None

**Module requirements:** good writing and oral presentation skills, extensive reading.

**Module calendar:** Semester II

**Textbook (s):-**

- ◆ Bains W. 1993, Biotechnology from A to Z, Oxford Univ. Press, Oxford.

**Reading Material**

- ◆ Crueger, W. and Crueger A. 1984. Biotechnology: A Textbook of Industrial Microbiology. Science Tech. Madison, USA

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| <b>Course title: Dairy Products Technology</b>  |
| <b>Module Code: FSTH 542</b>  |
| <b>Credit value of Module: 3 Cr. Hr</b>   |
| <p><b>Description of Module:</b><br/> This course discusses sources, and composition of milk, processing of market milk, standardization, toning of milk, homogenization, pasteurization, sterilization, storage, transportation and distribution of milk. It will also dwell on milk product processing-cream, butter, condensed milk, evaporated milk, whole and skimmed milk powder. Moreover, it covers a range issues relating to instantiation of milk and milk products, ice cream, milk sweets; judging and grading of milk and its products; fermented milk products; cheese, cheese spread, yoghurt, and similar products. Students will also be acquainted with dairy equipment and sanitization; frozen dairy products; butter; ghee; cheese; casein and its derivatives; condensed and evaporated milk, traditional products; whey powder, protein concentrate and isolate; lactose their composition, standards, manufacturing, process control and quality control parameters.</p>   |
| <p><b>Learning outcomes:</b><br/> After completion of this module, students will be able to grasp:</p> <ol style="list-style-type: none"> <li>1. Gain knowledge about the collection, chilling, transportation, cream separation, standardization, pasteurization, sterilization, homogenization, packaging, storage and distribution of fluid milk, flavored and enriched milk.</li> <li>2. Understand the principles and practices of manufacture, packaging, storage and marketing of cultured butter milk, acidophilus milk as well as yoghurt</li> <li>3. Gain knowledge of the standards of manufacture of hard, semi hard, soft and processed cheeses, storage and marketing of cheese as well as cheese defects and their control.</li> <li>4. Equipped with the technology of fat rich dairy products: which includes manufacture, packaging, storage and marketing of butter &amp; cream and butter defects and their control.</li> <li>5. Learn about the technology of frozen milk products including classification, standards manufacture, packaging, storage and marketing. Defects of frozen products and their control.</li> <li>6. Understand the technology of concentrated, evaporated and dried milk: standards manufacture, packaging, Storage, defects and their control.</li> </ol> |
| <p><b>Content:</b><br/> Topic 1- Introduction to milk and dairy products<br/> Topic 2- Microbiological and hygienic aspects of milk<br/> Topic 3- Chemical and physical properties of milk<br/> Topic 4- Dairy Products Processing (Chesses, yogurt, butter etc).</p>   |
| <p><b>Teaching strategy/methods:</b><br/> -The subject will be developed through extended lecture notes and theoretical exercises in which the syllabus topics will be reviewed, discussed and analyzed. Visits will be arranged to observe how milk is processed in factories.<br/> -Students will spend a significant amount of time in self-directed study, reading etc.<br/> - Some of the topics will be covered through group projects</p>  |
| <p><b>Assessment criteria:</b><br/> - Exam<br/> - Presentation skills and attendance</p>  |

- Field trip to milk processing companies
- Group work

**The respective role of instructors and students:**

**Students**

- Attend sessions
- Carry out, present and discuss individual and group tasks
- Carry out reading assignments
- Reflect on feedbacks and take actions

**Instructors**

- Conduct block teaching
- Facilitate students individual and group activities
- Assess students' performance
- Provide timely feedback and make follow-up on resulting developments
- Plan and implements students consultation program

**Teaching support and inputs for each content:**

- Self-reading
- Visit of food industries
- Lecture notes
- Group projects and discussions

**Pre-requisite module code(s): FSTH 442**

**Co-requisite module code (s):**

**Barred combination module (s): None**

**Module requirements:** good writing and oral presentation skills, extensive reading.

**Module calendar:** Semester II

**Textbook**

- ◆ Spreer, Edgar and Mixa, Axel . 1998. Milk and Dairy Product Technology, Marcel Dekker Inc.

**References:-**

- ◆ Miller, Gregory, McBean , Lois , Jarvis , Judith . 2006. Handbook of Dairy Foods and Nutrition, Third Edition



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| <b>Course title: Food Toxicology</b>   |
| <b>Module Code: FSTH 531</b>   |
| <b>Credit value of Module: 3 Cr. Hr</b>  |
| <p><b>Description of Module:</b><br/>Introduction to toxicology and toxic food components (heavy metals, organic toxicants, mycotoxins, phytotoxins, etc); modes of toxicity of key food born toxicants (chemical nature, metabolism, site of action and toxicity mechanism); human risk from food born toxicants and detoxification strategies</p>  |
| <p><b>Learning outcomes:</b><br/>After completion of this module, students will be able to grasp:</p> <ul style="list-style-type: none"> <li>• Identify the nature, origin, and means of avoiding toxicants in the food.</li> <li>• Explain the mechanism of action of toxicants and toxins</li> <li>• Appreciate Metabolism and biotransformation of toxicants (phase I &amp; II reactions)</li> <li>• Understand the formation, characteristics, and control of various toxins that occur in the production, storage, handling, and preparation of food</li> </ul> |
| <p><b>Content:</b><br/>Topic 1- Principles of toxicology<br/>Topic 2- Source of food toxicants and their mechanism of action<br/>Topic 3- Manifestations of toxicity<br/>Topic 4- Metabolism and Biotransformation of xenobiotic<br/>Topic 5- Pesticides and industrial contaminants</p>   |
| <p><b>Teaching strategy/methods:</b><br/>-The subject will be developed through extended lecture notes and theoretical exercises in which the syllabus topics will be reviewed, discussed and analyzed. Visits will be arranged to research laboratories and food manufacturers to better identify the state and challenges of producing safe food.<br/>-Students will spend a significant amount of time in self-directed study, reading etc.<br/>- Some of the topics will be covered through group projects</p>   |
| <p><b>Assessment criteria:</b><br/>- Exam<br/>- Presentation skills and attendance<br/>- Field trip<br/>- Group work</p>   |
| <p><b>The respective role of instructors and students:</b><br/><b>Students</b><br/>Attend sessions<br/>Carry out, present and discuss individual and group tasks<br/>Carry out reading assignments<br/>Reflect on feedbacks and take actions<br/><b>Instructors</b><br/>Conduct block teaching<br/>Facilitate students individual and group activities<br/>Assess students' performance<br/>Provide timely feedback and make follow-up on resulting developments<br/>Plan and implements students consultation program</p>   |
| <b>Teaching support and inputs for each content:</b>   |

- Self-reading
- Visit of food industries
- Lecture notes
- Group projects and discussions

**Pre-requisite module code(s): FSTH 322 and FSTH 431**

**Co-requisite module code (s):**

**Barred combination module (s):** None

**Module requirements:** good writing and oral presentation skills, extensive reading.

**Module calendar:** Semester II

**Textbook**

S.S. Deshpande, 2002-Handbook of food toxicology, CRC.

**Reading materials**

Stanley T. Omaye,2004- Food and nutritional toxicology, CRC

Waldemar M. Dąbrowski,2005- Toxins in food, CRC.

**Course title: Food Legislation and Quality Control in Food Systems**

**Module Code: FSTH 542**

**Credit value of Module: 4 Cr. Hr**

**Description of Module:**

This course shall provide a general overview of the laws, regulations, history and policies that govern food regulations in Ethiopia from the perspective of food science. Additionally, it will provide a detailed examination of the major legislation, policies and initiatives in food regulation. This course will include practical applications of the food laws and regulations including regulatory compliance, administrative procedure, products liability litigation, food and color additive approval, nutritional labeling and analysis of relevant legislations and other legal precedents. Knowledge, information and experience gained through this course will give the student a better understanding of the legal issues involved in the regulation of foods and food products in Ethiopia and in the international arena. It also, familiarizes students with the concepts of quality; national and international standards concerning food quality assurance and total quality management system in the food industry. It also discusses quality management tools, quality criteria, their respective limits and quality monitoring system for different types of foods. Furthermore, the basis behind food quality control/assurance will be discussed along with its application to various food systems to control and improve the quality and safety of food supply. Statistical quality and statistical process control methods (control charts and sampling procedures) shall be emphasized

**Learning outcomes:**

After completion of this module, students will be able to grasp:

1. the differences and similarities between international and domestic food law and regulation and to have access the most recent changes
2. Understand Familiarize themselves with government laws and regulations that contribute to a safe, nutritious, and wholesome food supply in Ethiopia.
3. Understand how technological, social and political forces interact in the development of food law and regulation.
4. Understand global perspectives on the challenges and opportunities in the international food trade, including the steps being taken towards international harmonization, key international players and potential outcomes.
5. Understand critical domestic and international regulatory issues and their impact on food laws as shall be illustrated by case studies.
6. Acquaint students with the current issues of food laws and regulations, especially those in connection with nutrition labeling, food additives (e.g. colorings) as well as toxic and harmful (e.g. heavy metals) substances in foods and to have a good grasp of the knowledge of quality criteria
7. Apply the basic knowledge in achieving quality control of food products and food production processes and Promote their focus on quality management, quality assurance systems and tools and Familiarize themselves with national and international standards
8. Understand government regulations, and overall quality plans such as HACCP
9. Develop procedures and approaches to identify food safety hazards in food processing.
10. Apply preventive measures and control methods to minimize microbiological hazards and maintain quality of foods and Develop quality control strategies.

**Content:**

Topic 1. Introduction to food legislations

Topic 2. Food Standards Regulating bodies (Ethiopian Standards, Codex Alimentarius,

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| <p style="text-align: center;">FAO, WHO, ISO standards, USA and EU StandardsTopic)</p> <p>Topic 3. Principles of Food Quality Control</p> <p>Topic 4. Evaluation of Food Quality</p> <p>Topic 5. Quality control laboratory layout</p>   |
| <p><b>Teaching strategy/methods:</b></p> <ul style="list-style-type: none"> <li>-The subject will be developed through extended lecture notes and theoretical exercises in which the syllabus topics will be reviewed, discussed and analyzed.</li> <li>-Students will spend a significant amount of time in self-directed study, reading etc.</li> <li>- Some of the topics will be covered through group projects</li> </ul>   |
| <p><b>Assessment criteria:</b></p> <ul style="list-style-type: none"> <li>- Exam</li> <li>- Presentation skills and attendance</li> <li>- Field trip</li> <li>- Group work</li> </ul>  |
| <p><b>The respective role of instructors and students:</b></p> <p><b>Students</b></p> <p>Attend sessions</p> <p>Carry out, present and discuss individual and group tasks</p> <p>Carry out reading assignments</p> <p>Reflect on feedbacks and take actions</p> <p><b>Instructors</b></p> <p>Conduct block teaching</p> <p>Facilitate students individual and group activities</p> <p>Assess students' performance</p> <p>Provide timely feedback and make follow-up on resulting developments</p> <p>Plan and implements students consultation program</p>  |
| <p><b>Teaching support and inputs for each content:</b></p> <ul style="list-style-type: none"> <li>- Self-reading</li> <li>- Visit of food industries</li> <li>- Lecture notes</li> <li>- Group projects and discussions</li> </ul>  |
| <p><b>Pre-requisite module code(s): STAT-201 , FSTH 412,FSTH 422 and FSTH 531</b></p>  |
| <p><b>Co-requisite module code (s):</b></p>  |
| <p><b>Barred combination module (s): None</b></p>  |
| <p><b>Module requirements:</b> good writing and oral presentation skills, extensive reading.</p>   |
| <p><b>Module calendar:</b> Semester II</p>   |
| <p><b>Textbook</b></p> <ul style="list-style-type: none"> <li>◆ Early, R.(Ralph) 1995 Guide to quality management systems for the food industry , Blackie Academic &amp; Professional, London</li> </ul> <p><b>References</b></p> <ul style="list-style-type: none"> <li>◆ Vasconcellos, J. Andres . 2004. Quality Assurance for the Food Industry. A Practical Approach. CRC Press</li> <li>◆ Curtis, P.A. 2005. A Guide to Food Laws and Regulations, ed. Wiley-Blackwell Publishers</li> <li>◆ US Food Law: USDA website: <a href="http://www.fsis.usda.gov/">http://www.fsis.usda.gov/</a> and FDA website: <a href="http://www.fda.gov">http://www.fda.gov</a></li> <li>◆ EU Food Law: <a href="http://www.europa.eu.int/">http://www.europa.eu.int/</a></li> </ul> |

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| <b>Course title: Senior Project</b>   |
| <b>Module Code: FSTH 562</b>  |
| <b>Credit value of Module: 6 Cr. Hr</b>   |
| <p><b>Description of Module:</b><br/> The purpose of this course is to enable students to put together and materialize the various concepts and principles they have acquired through the years in solving a real world problem. They will identify and define a problem area worth a semester period, write a project proposal, develop requirement analysis, write a project management plan and then carry out the project according to the plan. To accomplish these students will be organized in teams and assigned an advisor who mentors them throughout the project and guides them to successful completion. Evaluation will be conducted by a panel of instructors which will comprise of the advisor and examiners. To provide an all-rounded evaluation there will be written report submission and oral presentation at the end of the project.</p>       |
| <p><b>Learning outcomes:</b><br/> After completion of this module, students will be able to grasp:</p> <ul style="list-style-type: none"> <li>• Identify and select real world organizational problems that could be solved using computer systems</li> <li>• Perform feasibility analysis of the problem proposed</li> <li>• Manage projects efficiently and effectively</li> <li>• Combine system development and project management techniques and strategies</li> <li>• Organize and manage teams properly by the use of proper communication and coordination mechanisms</li> <li>• Develop soft skills that polish and advance their technical expertise in the work force</li> <li>• Prepare project documentations and presentations professionally</li> <li>• Develop and nurture the habit of receiving and giving positive criticism and feedback</li> </ul> |
| <p><b>Teaching strategy/methods:</b><br/> -Mentoring<br/> -Facilitate students group and individual tasks<br/> - Assess students' performance<br/> -Provide timely feedback and make follow-up on resulting developments<br/> -Plan and implements students consultation program</p> <p><b>Students role</b><br/> Design a project<br/> -Execute the project<br/> - Develop project report</p>  |
| <b>Pre-requisite module code(s): FSTH 421, FSTH 451 &amp; STAT 301</b>  |
| <b>Co-requisite module code (s):</b>  |
| <b>Barred combination module (s): None</b>  |
| <b>Module requirements:</b> good writing and oral presentation skills, extensive reading.   |
| <b>Module calendar:</b> Semester II   |

### 15.5.2. Supportive Courses

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| <b>Course title: Applied Biology</b>  |
| <b>Module Code: BIOL 201</b>  |
| <b>Credit value of Module: 4 Cr. Hr</b>   |
| <b>Description of Module:</b><br>General Biology is a comprehensive introductory course, emphasizing the areas of cell biology, genetics, and embryology and cell differentiation. It further acquaints students with basic concepts ranging from cellular to the ecosystem level, including biochemistry, cell biology, molecular biology, genetics, and evolution. This course satisfies the life science foundation requirement for Food Science students. Furthermore, in the laboratory, students will learn and use the fundamental concepts of biology to draw conclusions from data, to develop alternative hypotheses to explain observations, to make predictions, and to design experiments to test hypotheses.  |
| <b>Learning outcomes:</b><br>After completion of this module, students will be able to grasp: <ol style="list-style-type: none"><li>1. Understand the principles of cell biology, heredity, development and cell differentiation</li><li>2. Gain knowledge of the systems concept and to apply it to food science</li><li>3. Familiarize them with interpreting and reporting experimental data</li><li>4. Acquaint them with selected laboratory techniques</li><li>5. understand the scientific process; distinguish observation, hypothesis, test, and theory</li><li>6. know how to use a microscope for studying cells</li><li>7. Recognize and know properties of the major classes of biological molecules</li><li>8. Know the characteristics of living things and each of the major groups of living things</li><li>9. Know the function of cellular organelles</li><li>10. Understand the structure and functions of cell membranes</li><li>11. Understand how enzymes catalyze reactions and how they are important to life</li><li>12. Know how to determine the rate of an enzyme catalyzed reaction</li><li>13. Know how to recognize competitive and noncompetitive inhibitors of enzymes</li><li>14. Know how to use a centrifuge for cellular fractionation</li><li>15. Know how to conduct an experiment for determining the location of biochemical processes within cells</li><li>16. Understand now a method for separating lipid soluble molecules</li><li>17. Know how to describe the absorption spectrum</li></ol> |
| <b>Content:</b><br>Topic 1 : Characteristics of living things (Nutrition, Respiration, Irritability/sensitivity, Movement, Excretion, Reproduction, Growth)<br>Topic 2 : Diversity of life:<br>Topic 3 : Cells<br>Topic 4 : Cell membrane and transport system<br>Topic 5 : The respiratory system<br>Topic 6 : The nervous system<br>Topic 7 : The reproductive system<br>Topic 8 : The digestive system   |

Topic 9 : The excretory system  
Topic 10: Musculoskeletal system  
Topic 11: Genetics

**Teaching strategy/methods:**

- The subject will be developed through extended lecture notes and theoretical exercises in which the syllabus topics will be reviewed, discussed and analyzed.
- Students will spend a significant amount of time in self-directed study, reading etc.
- Some of the topics will be covered through group projects

**Assessment criteria:**

- Exam
- Presentation skills and attendance
- Group work

**The respective role of instructors and students:**

**Students**

Attend sessions  
Carry out, present and discuss individual and group tasks  
Carry out reading assignments  
Reflect on feedbacks and take actions

**Instructors**

Conduct block teaching  
Facilitate students individual and group activities  
Assess students' performance  
Provide timely feedback and make follow-up on resulting developments  
Plan and implements students consultation program

**Teaching support and inputs for each content:**

- Self-reading
- Lecture notes
- Group projects and discussions

**Pre-requisite module code(s): None**

**Co-requisite module code (s):**

**Barred combination module (s): None**

**Module requirements:** good writing and oral presentation skills, extensive reading.

**Module calendar:** Semester II

**Textbook**

- ◆ Rave, Peter. 2005. Biology, Mc Graw Hill.

**Reference (s):**

- ◆ Star, C. 2006. Biology: Concepts and Applications, 6th Edition

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| <b>Course title: Applied Chemistry</b>   |
| <b>Module Code: CHEM 201</b>   |
| <b>Credit value of Module: 4 Cr. Hr</b>  |
| <p><b>Description of Module:</b><br/> Fundamental concepts of physical, inorganic, and analytical chemistry are developed. Students are introduced to the physical chemistry concepts of atomic theory, chemical bonding, molecular structure, intermolecular forces, states of matter, and thermodynamics. Inorganic concepts of reaction types and stoichiometry are included. Lab stresses analytical techniques including quantitation, separation, titration, and statistical analysis of data. Many of the lab reports require use of spreadsheets or other computer software.</p>   |
| <p><b>Learning outcomes:</b><br/> After completion of this module, students will be able to grasp:</p> <ol style="list-style-type: none"> <li>1. Develop an understanding of the atomic and molecular nature of matter and of the chemical reactions that describe their transformations.</li> <li>2. Understand individual and collaborative quantitative skills necessary to solve chemical problems using the concepts of balanced chemical reactions, stoichiometry, and chemical equilibrium</li> <li>3. Gain an understanding of the properties of matter in the gas phase.</li> <li>4. Gain an understanding of acids and bases and their reactivity in aqueous solutions.</li> <li>5. Understand the periodic table as an organizing concept of chemical properties</li> <li>6. Develop basic laboratory skills and understand common laboratory practices, procedures, and equipment, including safety issues.</li> <li>7. Develop skills in observation and experimentation to solve problems</li> <li>8. Analyze and interpret scientific data</li> <li>9. Ascertain writing skills in presentation of lab reports</li> </ol> |
| <p><b>Content:</b><br/> Topic 1- Basic concepts<br/> Topic 2- Atoms, Matter and Mixtures<br/> Topic 3- Stoichiometry<br/> Topic 4- Chemical Bonding and Molecular Geometry<br/> Topic 5- Chemical reactions<br/> Topic 6: Thermo-chemistry and energy<br/> Topic 7: Applications in Environmental Science and Food science and technology</p>  |
| <p><b>Teaching strategy/methods:</b><br/> -The subject will be developed through extended lecture notes and theoretical exercises in which the syllabus topics will be reviewed, discussed and analyzed. Visits will be arranged to research laboratories and food manufacturers to better identify the state and challenges of producing safe food.<br/> -Students will spend a significant amount of time in self-directed study, reading etc.<br/> - Some of the topics will be covered through group projects</p>  |
| <p><b>Assessment criteria:</b><br/> - Exam<br/> - Presentation skills and attendance<br/> - Field trip<br/> - Group work</p>   |



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| <p><b>The respective role of instructors and students:</b></p> <p><b>Students</b><br/> Attend sessions<br/> Carry out, present and discuss individual and group tasks<br/> Carry out reading assignments<br/> Reflect on feedbacks and take actions</p> <p><b>Instructors</b><br/> Conduct block teaching<br/> Facilitate students individual and group activities<br/> Assess students performance<br/> Provide timely feedback and make follow-up on resulting developments<br/> Plan and implements students consultation program</p>                                     |
| <p><b>Teaching support and inputs for each content:</b></p> <ul style="list-style-type: none"> <li>- Self-reading</li> <li>- Visit of food industries</li> <li>- Lecture notes</li> <li>- Group projects and discussions</li> </ul>  |
| <p><b>Pre-requisite module code(s): None</b></p>   |
| <p><b>Co-requisite module code (s):</b></p>  |
| <p><b>Barred combination module (s): None</b></p>  |
| <p><b>Module requirements:</b> good writing and oral presentation skills, extensive reading.</p>   |
| <p><b>Module calendar:</b> Semester II</p>   |
| <p><b>Textbook (s):</b></p> <ul style="list-style-type: none"> <li>◆ Brown, LeMay, Bursten, and Murphy, 2009. Chemistry, the Central Science, 11th edition, Pearson</li> </ul> <p><b>Reference (s):-</b></p> <ul style="list-style-type: none"> <li>◆ Grace R. Hered, William H. Nebergall, and William Hered. 1997. Basic Laboratory Studies in College Chemistry, Tenth Edition (Lexington, Mass: D.C. Heath and Company)</li> <li>◆ Darrell D. Ebbing, and Steven D. Gammon. 2003. General Chemistry, Seventh Edition (Boston, Mass: Houghton Mifflin Company)</li> </ul> |

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| <b>Course title: Applied Mathematics</b>   |
| <b>Module Code: MATH 201</b>   |
| <b>Credit value of Module: 4 Cr. Hr</b>  |
| <p><b>Description of Module:</b><br/> Basic mathematics logic , sets and its operations, functions and its graphs, matrix and its manipulations, .system of linear equations , complex numbers and elementary counting principles.</p>   |
| <p><b>Learning outcomes:</b><br/> After completion of this module, students will be able to grasp:<br/> At the end of this course, students should be able to:</p> <ul style="list-style-type: none"> <li>➤ Know and explain <ul style="list-style-type: none"> <li>• the basic concepts of mathematical logic</li> <li>• methods and procedures in combining and determining the validity of statements</li> <li>• basic facts about arguments and validity</li> </ul> </li> <li>➤ know and explain <ul style="list-style-type: none"> <li>• facts and principles about sets</li> <li>• rules of operations on sets and apply rules and principles of set theory to practical situations</li> </ul> </li> <li>➤ explain the basic concept and properties of different types of functions</li> <li>➤ sketch the graphs of linear, quadratic, polynomial functions, logarithmic and exponential functions and trigonometric functions</li> <li>➤ explain the basic concept of matrix and relate with system of equations</li> <li>➤ analyze the system of linear equations of 2X2 and 3X3</li> <li>➤ define and manipulate complex numbers</li> <li>➤ define and apply the basic principle of counting</li> </ul> <p>1.</p> |
| <p><b>Content:</b><br/> Topic 1 - Logic, Sets and Set Operation (Basics of Mathematics Logic, The Concepts Of Sets And Elements)<br/> Topic 2 - Functions and Graphs (Functions and Graphs Of Linear, Quadratic, Polynomial, Exponential And Logarithmic, Trigonometry)<br/> Topic 3 - Matrix<br/> Topic 4 - System of Linear Equations<br/> Topic 5 - Complex Numbers<br/> Topic 6 - Elementary Counting Principles</p>   |
| <p><b>Teaching strategy/methods:</b><br/> Lecturing 4 hrs per week for 16 weeks<br/> -Assigning exercises per topic to solve them independently or in groups<br/> - Some of the topics will be covered through group projects</p>  |

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| <b>Assessment criteria:</b>   |     |
| Assignment (Individual or group)  | 30% |
| -Continuous test  | 30% |
| -Participation  | 10% |
| -Final exam   | 30% |
| <b>The respective role of instructors and students:</b>   |     |
| <b>Students</b>   |     |
| Attend sessions   |     |
| Carry out, present and discuss individual and group tasks   |     |
| Carry out reading assignments   |     |
| Reflect on feedbacks and take actions   |     |
| <b>Instructors</b>  |     |
| Conduct block teaching  |     |
| Facilitate students individual and group activities   |     |
| Assess students' performance  |     |
| Provide timely feedback and make follow-up on resulting developments  |     |
| Plan and implements students consultation program   |     |
| <b>Teaching support and inputs for each content:</b>  |     |
| 1. Applied Finite Mathematics, S. T. Tan, 5 <sup>th</sup> Edition, 1997 (We have 30 copies)   |     |
| 2. College Algebra, Hornsby and Lial, 2 <sup>nd</sup> Edition, 1999 (We have 38 copies)   |     |
| 3. Calculus for Business, Economics , Life and Social Sciences , Raymond A Barnett<br>10ed, 2005  |     |
| 4. Trigonometry ,enhanced with graphing utilities, a right triangle approach, Michael<br>Sullivan, fourth edition   |     |
| <b>Pre-requisite module code(s): None</b>   |     |
| <b>Co-requisite module code (s):</b>  |     |
| <b>Barred combination module (s): None</b>  |     |
| <b>Module requirements:</b> good writing and oral presentation skills, extensive reading.   |     |
| <b>Module calendar:</b> Semester II   |     |
| <b>Textbook</b>   |     |
| Applied Mathematics for Managerial, Life and Social Sciences , S.T. Tan<br>4ed.,2003<br>: Mathematics student text book for grade 11 and 12 (preparatory) |     |

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| <b>Course title: Applied Physics</b>  |
| <b>Module Code: PHYS 201</b>  |
| <b>Credit value of Module: 4 Cr. Hr</b>   |
| <p><b>Description of Module:</b><br/> The purpose of this course is to reinforce previous learning of physics by focusing on the applied physics needed as support for the technical courses students will be taking in advanced studies. The theoretical work will be supported by a series of practical laboratory exercises. The topics covered include applications in 1-d and 2-d motion, forces, energy and momentum, torque and center of mass, statics, wave motion and sound, heat and temperature, electric charge, electric potential, electric current and magnetism.</p>   |
| <p><b>Learning outcomes:</b><br/> After completion of this module, students will be able to grasp:</p> <ol style="list-style-type: none"> <li>2. Discuss the physical world based on a broad understanding of how it works</li> <li>3. Apply physics concepts when taking the technical courses where this skill is needed</li> <li>4. Reinforce past learning through performing practical exercises in important areas of physics</li> <li>5. Solve problems by using trouble shooting skills</li> <li>6. Apply skill in working with instruments including data acquisition systems.</li> <li>7. Be curious about the physical world and want to know more about it</li> </ol> |
| <p><b>Content:</b></p> <ul style="list-style-type: none"> <li>Topic 1: Basic concepts and units of dimension</li> <li>Topic 2: Kinematics and Dynamics</li> <li>Topic 3: Gravitational, circular motion and rotary motion</li> <li>Topic 4: Energy and momentum</li> <li>Topic 5: Equilibrium</li> <li>Topic 6: Heat</li> <li>Topic 7: Fluids</li> <li>Topic 8: Oscillations and sound</li> <li>Topic 9: Electricity</li> </ul>   |
| <p><b>Teaching strategy/methods:</b></p> <ul style="list-style-type: none"> <li>-The subject will be developed through extended lecture notes and theoretical exercises in which the syllabus topics will be reviewed, discussed and analyzed.</li> <li>-Students will spend a significant amount of time in self-directed study, reading etc.</li> <li>- Some of the topics will be covered through group projects</li> </ul>  |
| <p><b>Assessment criteria:</b></p> <ul style="list-style-type: none"> <li>- Exam</li> <li>- Presentation skills and attendance</li> <li>- Group work</li> </ul>   |
| <p><b>The respective role of instructors and students:</b></p> <p><b>Students</b><br/> Attend sessions<br/> Carry out, present and discuss individual and group tasks<br/> Carry out reading assignments<br/> Reflect on feedbacks and take actions</p> <p><b>Instructors</b></p>   |

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| <p>Conduct block teaching</p> <p>Facilitate students individual and group activities</p> <p>Assess students' performance</p> <p>Provide timely feedback and make follow-up on resulting developments</p> <p>Plan and implements students consultation program</p> |
| <p><b>Teaching support and inputs for each content:</b></p> <ul style="list-style-type: none"> <li>- Self-reading</li> <li>- Visit of food industries</li> <li>- Lecture notes</li> <li>- Group projects and discussions</li> </ul>                               |
| <p><b>Pre-requisite module code(s): FSTH 221</b></p>  |
| <p><b>Co-requisite module code (s):</b></p>   |
| <p><b>Barred combination module (s):</b> None</p>   |
| <p><b>Module requirements:</b> good writing and oral presentation skills, extensive reading.</p>  |
| <p><b>Module calendar:</b> Semester II</p>  |
| <p><b>Textbook</b></p> <p>◆ Wilson et al, 2009. College Physics, 6<sup>th</sup> Edition, 2007 and 7<sup>th</sup> Edition,</p>   |

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| <b>Course title: Introduction to Probability and Statistics</b>   |
| <b>Module Code: STAT 301</b>  |
| <b>Credit value of Module: 3 Cr. Hr</b>   |
| <p><b>Description of Module:</b><br/> This course is designed to show students the meaning of statistics, methods of data collection, methods of data presentation, and how to calculate measures of central tendency, measures of variation, moments, skewness and kurtosis, counting techniques, concepts of probability, probability distributions, sampling and sampling distribution of the sample, linear regression and correlation.</p>   |
| <p><b>Learning outcomes:</b><br/> After completion of this module, students will be able to grasp:</p> <ul style="list-style-type: none"> <li>• Discuss and use statistical methods.</li> <li>• Organize and analyze statistical data</li> <li>• Interpret and apply statistical analyses</li> </ul>  |
| <p><b>Content:</b><br/> Topic 1: Basic concepts in Statistics<br/> Topic 2: Data collection methods<br/> Topic 3: Measures of central tendency, variation<br/> Topic 4: Graphical representation of data<br/> Topic 5: Normal distribution<br/> Topic 6: Probability in statistics</p>  |
| <p><b>Teaching strategy/methods:</b><br/> -The subject will be developed through extended lecture notes and theoretical exercises in which the syllabus topics will be reviewed, discussed and analyzed.<br/> -Students will spend a significant amount of time in self-directed study, reading etc.<br/> - Some of the topics will be covered through group projects</p>   |
| <p><b>Assessment criteria:</b><br/> - Exam<br/> - Presentation skills and attendance<br/> - Field trip<br/> - Group work</p>  |
| <p><b>The respective role of instructors and students:</b><br/> <b>Students</b><br/> Attend sessions<br/> Carry out, present and discuss individual and group tasks<br/> Carry out reading assignments<br/> Reflect on feedbacks and take actions<br/> <b>Instructors</b><br/> Conduct block teaching<br/> Facilitate students individual and group activities<br/> Assess students' performance<br/> Provide timely feedback and make follow-up on resulting developments<br/> Plan and implements students consultation program</p> |
| <p><b>Teaching support and inputs for each content:</b><br/> - Self-reading<br/> - Visit of food industries</p>   |

- Lecture notes
- Group projects and discussions

**Pre-requisite module code(s): FSTH 221**

**Co-requisite module code (s):**

**Barred combination module (s): None**

**Module requirements:** good writing and oral presentation skills, extensive reading.

**Module calendar:** Semester II

**Textbook**

1. Basic Statistics for Business and Economics, Lind et al., 2006 (Business related students)
2. Introduction to Statistics and its Applications, Adem Kedir Geleto, 2ed, 2009 (Technical students)

**Laboratory Manual**

1. Microsoft Excel Manual, A. Bluman, 2007

**References**

1. Elementary Statistics in Social Research, Jack Levin/James Alan, 9ed, 2003
2. Complete Business Statistics, Aczel and Sounderpandian. 2006
3. Just The Essentials of Elementary Statistics, Johnson/Kuby: 3ed, 2003

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| <b>Course title: Introduction to Information and Communication Technology</b>  |
| <b>Module Code: INSY 201 same as INTE 201</b>  |
| <b>Credit value of Module: 3 Cr. Hr</b>  |
| <p><b>Description of Module:</b><br/> This course provides an overview of Information and Communication Technology as an introduction. Topics include the development of computers, data representation, logical organization of a computer system, computer software, computer hardware, computer networking and communication, problem solving using computers, operating systems (single and multi-user) and the windows environment. Moreover the course discusses components of information systems and their type. This course will be supported by a practical laboratory sessions where students are exposed to hands-on experience in using computers. Specifically they will work on Microsoft Windows operating system followed by office applications (like MS-Word, MS-Excel) and other useful and software tools and applications.</p> |
| <p><b>Learning outcomes:</b><br/> After completion of this module, students will be able to grasp:</p> <ol style="list-style-type: none"> <li>1. Explain what IT and ICT are and how they are used as tool for development</li> <li>2. Understand the components of modern technological infrastructures such as relevant hardware, software, networks, telecommunications and internet systems</li> <li>3. Discuss what information system is and its types</li> <li>4. Know how to use Microsoft windows operating systems</li> <li>5. Use Microsoft application software</li> </ol>   |
| <p><b>Content:</b><br/> Topic 1- Introduction to computer systems<br/> Topic 2- Using the Internet<br/> Topic 3- Using Word Processing<br/> Topic 4- Using spreadsheets<br/> Topic 5- Making presentations<br/> Topic 6-Elective Projects</p>  |
| <p><b>Teaching strategy/methods:</b><br/> The class meets in a computer lab and follows the pattern: half-hour lecture, one-hour directed computer work, ¼ hour typing practice, one-hour supervised practice time.</p>  |
| <p><b>Assessment criteria:</b><br/> - Exam<br/> - Presentation skills and attendance<br/> - Group work</p>   |
| <p><b>The respective role of instructors and students:</b><br/> <b>Students</b><br/> Attend sessions<br/> Carry out, present and discuss individual and group tasks<br/> Carry out reading assignments<br/> Reflect on feedbacks and take actions<br/> <b>Instructors</b><br/> Conduct block teaching<br/> Facilitate students individual and group activities</p>   |



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| <p>Assess students' performance<br/> Provide timely feedback and make follow-up on resulting developments<br/> Plan and implements students consultation program</p>  |
| <p><b>Teaching support and inputs for each content:</b></p> <ul style="list-style-type: none"> <li>- Self-reading</li> <li>- Visit of food industries</li> <li>- Lecture notes</li> <li>- Group projects and discussions</li> </ul>   |
| <p><b>Pre-requisite module code(s): None</b></p>  |
| <p><b>Co-requisite module code (s):</b></p>   |
| <p><b>Barred combination module (s): None</b></p>   |
| <p><b>Module requirements:</b> good writing and oral presentation skills, extensive reading.</p>  |
| <p><b>Module calendar:</b> Semester II</p>  |
| <p><b>Textbook</b></p> <ul style="list-style-type: none"> <li>◆ Shelly, Cashman and Vermatt, Discovering Computers 2004/2003/2002, Thomson Course Tech., 2004/2003/2002</li> </ul> <p><b>Reading Materials</b></p> <ol style="list-style-type: none"> <li>1. Rainer, Turban &amp; Potter, Introduction to Information Systems, John Wiley &amp; Sons, 2007,</li> <li>2. June Jamrich Parsons and Dan Oja, Computer Concepts, 5th edition, Thomson Course Tech., 2004</li> <li>3. Williams, Sawyer and Hutchinson, Using Information Technology, 3rd edition, McGrawHill,1999</li> <li>4. Zimmerman, Information Technology Applications, 2007, Thomson Course Tech.</li> <li>5. Keyboarding &amp; Information Processing, 1997, South Western Educational Publishing</li> </ol> |

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| <b>Course title: Introduction to Entrepreneurship</b>   |
| <b>Module Code: MAEN 211</b>  |
| <b>Credit value of Module: 3 Cr. Hr</b>   |
| <p><b>Description of Module:</b><br/> This course is an introduction to entrepreneurship. Topics include economic, social and political climate; demographic, technological and social changes; skills, challenges, and rewards of entrepreneurship. This course will provide a basic understanding of the entrepreneurial or new venture process. Students will discuss the critical role that opportunity recognition and creation plays in that process. Several class exercises will assist students to identify their own personal goals, and their unique skills and competencies related to the entrepreneurial process. Students will also develop a simple business plan, which will enable them to examine how entrepreneurs and investors create, find, and differentiate robust, money-making opportunities from “good ideas.”</p>  |
| <p><b>Learning outcomes:</b><br/> After completion of this module, students will be able to grasp:</p> <ul style="list-style-type: none"> <li>• Develop a simple business plan.</li> <li>• Evaluate their entrepreneurial tendencies and create a new venture.</li> <li>• Explain the role of entrepreneurship and new venture creation in economic development.</li> <li>• Evaluate and explain the real-world of entrepreneurship and the entrepreneurial mindset.</li> <li>• Understand the process of opportunity recognition and analysis.</li> <li>• Clearly articulate a new venture’s business model.</li> <li>• Recognize the importance of teams in the entrepreneurial process and the pros and cons. associated with different behavior types when starting a new venture.</li> <li>• Be familiar with the financial issues associated with new venture start-ups.</li> <li>• Develop an understanding of entrepreneurship as a business behavior worldwide.</li> </ul> |
| <p><b>Content:</b><br/> Topic 1- Introduction to Entrepreneurship<br/> Topic 2- Recognizing opportunities and generating ideas<br/> Topic 3- Feasibility Analysis<br/> Topic 4- Writing a business plan<br/> Topic 5- Industry and Competitor Analysis<br/> Topic 6- Developing and Effective Business Model<br/> Topic 7- Getting financing of funding</p>   |
| <p><b>Teaching strategy/methods:</b><br/> -The subject will be developed through extended lecture notes and theoretical exercises in which the syllabus topics will be reviewed, discussed and analyzed. Visits will be arranged to research laboratories and food manufacturers to better identify the state and challenges of producing safe food.<br/> -Students will spend a significant amount of time in self-directed study, reading etc.<br/> - Some of the topics will be covered through group projects</p>   |
| <p><b>Assessment criteria:</b><br/> - Exam<br/> - Presentation skills and attendance</p>  |

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| <ul style="list-style-type: none"> <li>- Field trip</li> <li>- Group work</li> </ul>   |
| <p><b>The respective role of instructors and students:</b></p> <p><b>Students</b><br/> Attend sessions<br/> Carry out, present and discuss individual and group tasks<br/> Carry out reading assignments<br/> Reflect on feedbacks and take actions</p> <p><b>Instructors</b><br/> Conduct block teaching<br/> Facilitate students individual and group activities<br/> Assess students' performance<br/> Provide timely feedback and make follow-up on resulting developments<br/> Plan and implements students consultation program</p>  |
| <p><b>Teaching support and inputs for each content:</b></p> <ul style="list-style-type: none"> <li>- Self-reading</li> <li>- Visit of food industries</li> <li>- Lecture notes</li> <li>- Group projects and discussions</li> </ul>  |
| <p><b>Pre-requisite module code(s): None</b></p>   |
| <p><b>Co-requisite module code (s):</b></p>  |
| <p><b>Barred combination module (s): None</b></p>  |
| <p><b>Module requirements:</b> good writing and oral presentation skills, extensive reading.</p>   |
| <p><b>Module calendar:</b> Semester II</p>   |
| <p><b>Text Books</b><br/> Kuratko, Donald F. and Hodgetts, Richard H.,, Entrepreneurship: Theory, Process, Practice, 7th edition ,2008 ISBN 0-324-32341-7, Thomson South-Western.</p> <p><b>Reading materials</b></p> <ol style="list-style-type: none"> <li>1. Forsyth George R. Mount Joan and Ziger Terence .( 1991 ) Entrepreneurship and Small Business Development: Text and cases . ISBN- 0-13-282641-0.</li> <li>2. How to Write a Business Plan, Ethiopian Chamber of Commerce, 2004.</li> <li>3. Entrepreneurial Small Business, Katz, Jerry and Richard Green, 2008, 848 p.ISBN-10: 0073405063</li> </ol> |

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| <b>Course title: Basic Writing Skills</b>   |
| <b>Module Code: FLEN 201</b>  |
| <b>Credit value of Module: 3 Cr. Hr</b>   |
| <p><b>Description of Module:</b><br/> A course designed to develop college-level reading and writing skills. It includes oral and written response to readings, as well as academic vocabulary, grammar and mechanics. It focuses on the steps of the writing process: planning, organizing, writing, peer review, revising, and editing while writing essays in various patterns of organization and development. There will be in-class essays and others prepared outside of class. Students will write every day in class. In addition, students will improve listening and speaking skills through work in the Language Lab, listening to lectures and taking notes, class discussion, giving short talks and responding to questions.</p>                                 |
| <p><b>Learning outcomes:</b><br/> After completion of this module, students will be able to grasp:</p> <ol style="list-style-type: none"> <li>1. Understand and critically analyze class readings, as well as their Text Books.</li> <li>2. Improve their academic vocabulary, written and spoken grammar and mechanics usage</li> <li>3. Improve their overall writing skills: being able to write clearly and correctly, make points and support them with examples and explanations.</li> <li>4. Write under time pressure in answering essay examination questions.</li> <li>5. Understand oral academic lectures and basic English conversation.</li> <li>6. Make simple reports and presentations to the class on readings, discussions and professional tasks</li> </ol> |
| <p><b>Content:</b></p> <p>Topic 1- Descriptive adjective and other parts of speech<br/> Topic 2- Creating paragraphs and short stories using common tenses<br/> Topic 3- Sentence constructions<br/> Topic 4- Parallelism and modifiers<br/> Topic 5- Producing and developing Paragraphs<br/> Topic 6: Introducing essays<br/> Topic 7: Fundamentals of spoken English<br/> Topic 8: Reading skills<br/> Topic 9: Listening<br/> Topic 10: Language Lab</p>  |
| <p><b>Teaching strategy/methods:</b></p> <ul style="list-style-type: none"> <li>-The subject will be developed through extended lecture notes and theoretical exercises in which the syllabus topics will be reviewed, discussed and analyzed. Visits will be arranged to research laboratories and food manufacturers to better identify the state and challenges of producing safe food.</li> <li>-Students will spend a significant amount of time in self-directed study, reading etc.</li> <li>- Some of the topics will be covered through group projects</li> <li>-Language Labs, group work and assignments.</li> </ul>   |
| <p><b>Assessment criteria:</b></p> <ul style="list-style-type: none"> <li>- Exam</li> <li>- Presentation skills and attendance</li> </ul>   |

- Group work

**The respective role of instructors and students:**

**Students**

Attend sessions

Carry out, present and discuss individual and group tasks

Carry out reading assignments

Reflect on feedbacks and take actions

**Instructors**

Conduct block teaching

Facilitate students individual and group activities

Assess students' performance

Provide timely feedback and make follow-up on resulting developments

Plan and implements students consultation program

**Teaching support and inputs for each content:**

- Self-reading
- Visit of food industries
- Lecture notes
- Group projects and discussions

**Pre-requisite module code(s): None**

**Co-requisite module code (s):**

**Barred combination module (s): None**

**Module requirements:** good writing and oral presentation skills, extensive reading.

**Module calendar:** Semester II

**Textbook**

- ◆ Fawcett, S (2007) Evergreen: A Guide to Writing with Readings. Houghton Mifflin. USA.

**Secondary Text:**

- ◆ Bucsemi, S.V. and Smith, C. (2007). 75 Readings: Anthology. 10<sup>th</sup> edition. New York: McGraw-Hill.
- ◆ Boardman, C.A. and Frydenberg, J (2002). Writing to communicate: paragraphs and essays. 2<sup>nd</sup> edition. New York: Pearson
- ◆ Fleming, L., (2005). Reading for results, 9<sup>th</sup> edition. New York: Houghton Mifflin.
- ◆ Kennedy, X.J., Kennedy D.M. and Aaron, J.E. (2003). The brief Bedford Reader, 8<sup>th</sup> Edition. New York: Bedford.
- ◆ Lebauer, R.S. (1988). Learn to Listen; Listen to Learn- an advanced ESL-EFL Lecture Comprehension and Note Taking text book. New Jersey: Prince Hall.
  - Level, B. (2001). Writing and Grammar: Communication in Action, New Jersey: Prentice Hall,
- ◆ Wyrick, J., (2005) Steps to writing well, 6<sup>th</sup> Edition,

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| <b>Course title: English for Communication I</b>  |
| <b>Module Code: FLEN 202</b>  |
| <b>Credit value of Module: 3 Cr. Hr</b>   |
| <p><b>Description of Module:</b><br/> A course extending use of the writing process to longer essays based on analysis of readings, through awareness of audience, purpose and diverse viewpoints. Additional writing will be based on research in students' professional fields, incorporating credible evidence through quotations, paraphrase and summary, using MLA/APA. Students will learn to distinguish between opinion, facts and inferences and to use argument and persuasion. Students will prepare various types of letters, memos, email, proposals, graphics and documents which will be needed in their future professional work. Students will work in teams on a cross-disciplinary professional task, including written and oral work.</p>   |
| <p><b>Learning outcomes:</b><br/> After completion of this module, students will be able to grasp:</p> <ol style="list-style-type: none"> <li>1. Incorporate vocabulary appropriate to their field of study in their writing and speaking.</li> <li>2. Write essays with a clear thesis, logical points to support the thesis, and evidence based on library and internet research.</li> <li>3. Avoid plagiarism by incorporating research evidence using proper documentation.</li> <li>4. Improve writing and proofreading skills through participating in peer review.</li> <li>5. Write clear, concise and effective letters, reports, proposals, and other documents appropriate to their field of study, using library and internet research.</li> <li>6. Speak clearly and effectively in groups, meetings and in a final oral presentation for the professional task</li> </ol> |
| <p><b>Content:</b></p> <ul style="list-style-type: none"> <li>Topic 1- Planning and writing essays</li> <li>Topic 2- Writing direct and indirect quotations</li> <li>Topic 3- Writing informal, formal and business letters</li> <li>Topic 4- Editing and writing</li> <li>Topic 5- Introducing business communication</li> <li>Topic 6: Paraphrasing texts and summarizing audio and written texts</li> <li>Topic 7: Reading exercises</li> <li>Topic 8: Listening exercises</li> <li>Topic 9: Group presentation of a research paper</li> <li>Topic 10: Language Lab</li> </ul>   |
| <p><b>Teaching strategy/methods:</b></p> <ul style="list-style-type: none"> <li>-The subject will be developed through extended lecture notes and theoretical exercises in which the syllabus topics will be reviewed, discussed and analyzed.</li> <li>-Students will spend a significant amount of time in self-directed study, reading etc.</li> <li>- Some of the topics will be covered through group projects</li> </ul>  |
| <p><b>Assessment criteria:</b></p> <ul style="list-style-type: none"> <li>- Exam</li> <li>- Presentation skills and attendance</li> <li>- Field trip</li> <li>- Group work</li> </ul>   |
| <b>The respective role of instructors and students:</b>   |

**Students**

Attend sessions

Carry out, present and discuss individual and group tasks

Carry out reading assignments

Reflect on feedbacks and take actions

**Instructors**

Facilitate students individual and group activities

Assess students' performance

Provide timely feedback and make follow-up on resulting developments

Plan and implements students consultation program

**Teaching support and inputs for each content:**

- Self-reading
- Visit of food industries
- Lecture notes
- Group projects and discussions

**Pre-requisite module code(s): FLEN 201**

**Co-requisite module code (s):**

**Barred combination module (s): None**

**Module requirements:** good writing and oral presentation skills, extensive reading.

**Module calendar:** Semester II

**Text Books:**

1. Evergreen: A Guide to Writing with Readings, 8<sup>th</sup> Edition. Susan Fawcett. 2007. Cengage, ISBN10: 0618766448
2. Alred, Gerald J, Brusaw, Charles, Oliu, Walter; Business Writers' Handbook, 2008. Bedford
3. Alred, Gerald J, Brusaw, Charles, Oliu, Walter; Handbook of Technical Writing, 2008, 9<sup>th</sup> ed.

**References**

1. Michael Merkel, Technical Communication, 9e, ISBN9780-312485979 Bedford St. Martins.
2. Tom Jehn, Jane, Writing in the Disciplines: a Supplement, 2007, ISBN10: 0312452640
3. Discovering Arguments, an Introduction to Critical Thinking and Writing, 2e, D. Memering, 2006
4. Locker, Kaczmarek. Guide to Business Communication: Building Critical Skills, 2e, 2004.
5. Guffey, Mary Ellen. Business Writing, 2007. Thomson, Southwestern Publishers.
6. Writing and Speaking for Business, W. Baker, 2007, BYU Publishing.

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| <b>Course title: English for communication II</b>   |
| <b>Module Code: FLEN 301</b>  |
| <b>Credit value of Module: 3 Cr. Hr</b>   |
| <p><b>Description of Module:</b><br/> Following previous limited instruction in making brief talks and reports, this course is designed to improve students' ability to give effective formal presentations and work in groups. Students will focus on audience and purpose, with attention to organization, providing support for their points, appropriate use of visual aids and awareness of nonverbal behavior. They will give talks of varying length, planned and impromptu, followed by questions and feedback. Students will research and write a proposal paper relevant to their field, with proper documentation, and formally present their proposal using AV equipment. This will be good preparation for the professional task. In group assignments, students will learn to conduct effective meetings, negotiate, apply critical thinking in making decisions, deal with conflict usefully but respectfully, and use turn-taking and other English conversational conventions. Resume writing and interviewing skills will prepare them when they look for jobs.</p> |
| <p><b>Learning outcomes:</b><br/> After completion of this module, students will be able to grasp:</p> <ol style="list-style-type: none"> <li>1. Demonstrate awareness of audience, purpose, and the importance of skilled communication in the solution of business problems.</li> <li>2. Negotiate differences in communication between themselves and people from other cultures and those with viewpoints disagreeing with their own.</li> <li>3. Employ a variety of communication strategies;</li> <li>4. Make effective presentations, oral and written, with or without an equipment.</li> <li>5. Apply critical thinking and decision-making skills to business or technical tasks</li> <li>6. Work effectively with other people in small groups or teams</li> <li>7. Listen actively for understanding</li> <li>8. Give and receive feedback which will improve their own and others' communication.</li> </ol>  |
| <p><b>Content:</b><br/> Topic 1- Basics of English communication<br/> Topic 2- Audience-centered approach to communication<br/> Topic 3- Developing presentations<br/> Topic 4- Final presentation preparation<br/> Topic 5- Speech delivery<br/> Topic 6-Working within small groups<br/> Topic 7: Research-based proposal<br/> Topic 8: Employment skills</p>   |
| <p><b>Teaching strategy/methods:</b><br/> -The subject will be developed through extended lecture notes and theoretical exercises in which the syllabus topics will be reviewed, discussed and analyzed. -Students will spend a significant amount of time in self-directed study, reading etc.<br/> - Some of the topics will be covered through group projects</p>  |
| <p><b>Assessment criteria:</b><br/> - Exam<br/> - Presentation skills and attendance<br/> - Group work</p>  |



**The respective role of instructors and students:****Students**

Attend sessions  
Carry out, present and discuss individual and group tasks  
Carry out reading assignments  
Reflect on feedbacks and take actions

**Instructors**

Conduct block teaching  
Facilitate students individual and group activities  
Assess students' performance  
Provide timely feedback and make follow-up on resulting developments  
Plan and implements students consultation program

**Teaching support and inputs for each content:**

- Self-reading
- Visit of food industries
- Lecture notes
- Group projects and discussions

**Pre-requisite module code(s): FLEN 202****Co-requisite module code (s):****Barred combination module (s): None****Module requirements:** good writing and oral presentation skills, extensive reading.**Module calendar:** Semester II**Text Books:**

1. Public Speaking: An Audience-Centered Approach, Steven Beebe and Susan Beebe, 6 ed., 2006.
2. Munter, Mary and Lynn Russell, Guide to Presentations, 7<sup>th</sup> Ed, 2007.

**References**

- ◆ Rudolph Verderber, Communicate, 9<sup>th</sup> ed, 1999, Wadsworth Publishing. (150
- ◆ Locker, Kitty, Kaczmarek, Stephen Kyo, Building Critical Skills, 4th Ed. *McGraw-Hill, 2008.*
- ◆ The Art of Public Speaking, and Learning Tools Suite, 8e, by Stephen Lucas, 2004 + CD Rom, (12)
- ◆ Writing and Speaking for Business, W. H. Baker, 2007, BYU Publishing.
- ◆ Essentials of Business Communication, M.E. Guffey, 5e, 2007, Southwestern-Thomson.

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| <b>Course title: Civic and Ethical Education</b>   |
| <b>Module Code: CEED 201</b>   |
| <b>Credit value of Module: 3 Cr. Hr</b>  |
| <p><b>Description of Module:</b><br/> This fundamental objective of Civic and Ethical Education is producing good citizens with higher civic qualities. Good citizens who are well aware of their rights and responsibilities as well as endowed with various types of civic virtues such as active participation, tolerance, civic mindedness etc. have a lot to contribute in the process of democratization and development of their own state. In view of this, this course is designed to familiarize students with basic themes and concepts of civic and ethical education, constitutionalism, Democracy, Human Rights and some other pertinent issues in achieving the basic goal of the subject matter. The varying nature of civic education requires active participation from the part of students in various ways such as forwarding original arguments, participating in class discussions, debates, presentations, etc. Thus students are highly expected to act accordingly for the successful delivery of the course.</p> |
| <p><b>Learning outcomes:</b><br/> After completion of this module, students will be able to grasp:</p> <ul style="list-style-type: none"> <li>• Explain the national political system of Ethiopia in relation to citizenship</li> <li>• Impart civic knowledge on various issues such as on meaning and definition of civics and ethics, Constitutionalism, Democracy, Human Rights, State, and Government etc.</li> <li>• Understand their rights and responsibilities and then exercise their rights and discharge their responsibilities.</li> <li>• Develop such civic attitudes as patriotism, civic mindedness, active participation, tolerance etc.</li> <li>• Exhibit civic skills such as accurate decision making, expression of oneself clearly and logically, conflict resolution etc.</li> <li>• Become good citizens and play a crucial role in the democratization process of the state.</li> </ul>   |
| <p><b>Content:</b><br/> Topic 1- Understanding Civic and Ethics<br/> Topic 2- Understanding Society, State, and Government<br/> Topic 3- : Understanding Citizenship: Ethiopian Focus<br/> Topic 4- Constitution, Democracy and Human Right: Ethiopian in Focus<br/> Topic 5- : Ethics and Civic Virtue<br/> Topic 6: Issues in Civics and Ethics</p>  |
| <p><b>Teaching strategy/methods:</b><br/> -The subject will be developed through extended lecture notes and theoretical exercises in which the syllabus topics will be reviewed, discussed and analyzed.<br/> -Students will spend a significant amount of time in self-directed study, reading etc.</p>   |
| <p><b>Assessment criteria:</b><br/> - Exam<br/> - Presentation skills and attendance<br/> - Debate</p>   |
| <p><b>The respective role of instructors and students:</b><br/> <b>Students</b></p>  |

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| <p>Attend sessions<br/> Carry out, present and discuss individual and group tasks<br/> Carry out reading assignments<br/> Reflect on feedbacks and take actions</p> <p><b>Instructors</b><br/> Lecture<br/> Facilitate students individual and group activities<br/> Assess students' performance<br/> Provide timely feedback and make follow-up on resulting developments</p>   |
| <p><b>Teaching support and inputs for each content:</b></p> <ul style="list-style-type: none"> <li>- Self-reading</li> <li>- Visit of food industries</li> <li>- Lecture notes</li> <li>- Group projects and discussions</li> </ul>   |
| <p><b>Pre-requisite module code(s): FLEN 301</b></p>  |
| <p><b>Co-requisite module code (s):</b></p>   |
| <p><b>Barred combination module (s): None</b></p>   |
| <p><b>Module requirements:</b> good writing and oral presentation skills, extensive reading.</p>  |
| <p><b>Module calendar:</b> Semester II</p>  |
| <p><b>Text book</b></p> <ul style="list-style-type: none"> <li>◆ AAU (2005). Civic and Ethical Education, Compendium Part One and two. Addis Ababa: College of Social Sciences.</li> </ul> <p><b>Reading Materials</b></p> <ol style="list-style-type: none"> <li>1. Miller, E.D.I (1984). Question that matter: an invitation to Philosophy</li> <li>2. FDRE (1995). The constitution of Federal Democratic Republic of Ethiopia Addis Ababa.</li> <li>3. Vincent, B. (1980) Philosophy: a text with readings, chapter three ethics and chapter four, Social Philosophy.</li> <li>4. Kassaye, A. (2001), Fundamentals of Civic and Ethical Education. Aurum, A. and Popkin, H.(1996) introduction to Philosophy (Chapter 4 &amp; Chapter 5)</li> <li>5. Assefa Fiseha (2005) Federalism and the Accommodation of Diversity in Ethiopia: A Comparative Study, Netherlands, Wolf Legal Publishers.</li> <li>7. Fasil Nahum (1997), Constitution for a Nation of Nations: The Ethiopian Prospect. Asmara: The Red Sea pre</li> <li>8. Kassahun Berhanu (1998) 'Democracy, State-Building and Nations in Ethiopia: 1974-1995.' In Gros, Jean- Germain (ed.) Democratization in Late Twentieth- Century Africa coping with Uncertainty.</li> <li>9. Hope College College(2013) Civics and Ethics Course Material, Unpublished.Policy/legal Documents</li> </ol> |

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| <b>Course title: General Psychology</b>  |
| <b>Module Code: PSYC 201</b>   |
| <b>Credit value of Module: 3 Cr. Hr</b>  |
| <p><b>Description of Module:</b><br/> The introductory survey course explores the scientific study of human nature, behavior, and cognitive processes. The major areas of psychological study will be reviewed including history, biology, memory, learning, development, personality, abnormal and social psychology. Emphasis will be placed on applying psychological principles and data to life experience. The course is also geared towards helping students conceptualize the psychological foundations of human behavior in all occupations. It is also the application of the principles and concepts in overcoming various kinds of human and environmental barriers for effective relationship. Topics to be covered include motivation, emotion, knowledge retention, group dynamics and worker efficiency, sensation and perception, personality, and development of attitudes. Students will work on a proficiency task, developing a personal statement of goals and values.</p> |
| <p><b>Learning outcomes:</b><br/> After completion of this module, students will be able to grasp:</p> <ul style="list-style-type: none"> <li>• Understand human behavior and relationship in different professions and life at large,</li> <li>• Be able to apply knowledge gained in the areas of business, government and education,</li> <li>• Familiarize themselves with group and individual decision-making,</li> <li>• Exercise effective human and environmental relationships.</li> <li>• Use their knowledge of psychology in developing a personal statement of goals and values</li> </ul>   |
| <p><b>Content:</b><br/> Topic 1- What is Psychology?<br/> Topic 2- Principles of Learning<br/> Topic 3- Developmental Psychology<br/> Topic 4- Remembering (Memory) and Forgetting<br/> Topic 5- Motivation and Emotions<br/> Topic 6- Psychology of Personality<br/> Topic 7- Perception</p>  |
| <p><b>Teaching strategy/methods:</b></p> <ul style="list-style-type: none"> <li>- The subject will be developed through extended lecture notes and theoretical exercises in which the syllabus topics will be reviewed, discussed and analyzed. Visits will be arranged to research laboratories and food manufacturers to better identify the state and challenges of producing safe food.</li> <li>- Students will spend a significant amount of time in self-directed study, reading etc.</li> <li>- Some of the topics will be covered through group projects</li> </ul>   |
| <p><b>Assessment criteria:</b></p> <ul style="list-style-type: none"> <li>- Exam</li> <li>- Presentation skills and attendance</li> <li>-Group work</li> </ul>   |
| <p><b>The respective role of instructors and students:</b><br/> <b>Students</b></p>  |




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| <p>Attend sessions<br/> Carry out, present and discuss individual and group tasks<br/> Carry out reading assignments<br/> Reflect on feedbacks and take actions</p> <p><b>Instructors</b><br/> Conduct block teaching<br/> Facilitate students individual and group activities<br/> Assess students' performance<br/> Provide timely feedback and make follow-up on resulting developments<br/> Plan and implements students consultation program</p>  |
| <p><b>Teaching support and inputs for each content:</b></p> <ul style="list-style-type: none"> <li>- Self-reading</li> <li>- Visit of food industries</li> <li>- Lecture notes</li> <li>- Group projects and discussions</li> </ul>  |
| <p><b>Pre-requisite module code(s): None</b></p>   |
| <p><b>Co-requisite module code (s):</b></p>  |
| <p><b>Barred combination module (s): None</b></p>  |
| <p><b>Module requirements:</b> good writing and oral presentation skills, extensive reading.</p>   |
| <p><b>Module calendar:</b> Semester II</p>   |
| <p><b>Textbook</b><br/> Kalat, James. Introduction to Psychology, 8<sup>th</sup> ed. Wadsworth, 2008</p> <p><b>References</b></p> <ol style="list-style-type: none"> <li>1. Weiten, Wayne, Diane Helpem. Psychology: Themes and Variations: with Concept Charts. Briefer Edition, 7<sup>th</sup> ed. Thomson-Wadsworth, 2007</li> <li>2. Psychology: A Modular Approach to Mind and Behavior, 10e, Dennis Coon, 2006.</li> <li>3. Psychology, Stephen Davis and Joseph Pallidino, 4e, 2003</li> <li>4. The Essential World of Psychology, Samuel Wood and Ellen Green Wood, 2002.</li> <li>5. Psychology, 7<sup>th</sup> ed., John Santrock, 2005</li> </ol> |

## 16. PROGRAM COLLABORATORS

Hope College has a strong collaboration with the following institutions:

- **Addis Ababa University Institute of Technology (AAiT), School of Chemical and Bioengineering (Food Engineering Chair)**
- Addis Ababa University (AAU)–Centre for Food Science and Nutrition
- Addis Ababa Science and Technology University (ASTU)
- Ethiopian Public Health Institute (EPHI)-Directorate of Food and Nutrition (The former Ethiopian Health, Nutrition and Research Institute)
- Ethiopian Conformity Assessment Agency (ECA)

Moreover the college is in the process of signing MOU with regional universities that are working in food science, nutrition, post-harvest and technology such as:

-  Haramaya University-Department of Food Science and Post-Harvest Technology
-  Hawassa University-Department of Food Science, Nutrition and Post-Harvest Technology
-  Mekele University-Department of Food Science

**HOPE College of Business, Science and Technology**  
**DEPARTMENT OF FOOD SCIENCE AND TECHNOLOGY**

This curriculum was revised on February 2015 and again Revised and confirmed  
on December 2015.

1. Prepared by: Department of Food Science and Technology

Name of the department Head: **Anteneh Taye**

Date: **Dec. 04, 2015**

Signature: **Electronically Signed/confirmed by Anteneh**

2. Checked by: Vice President Office

Name of the Vice President: **Dr. Behailu Abebe**

Date: **Dec. 04, 2015**

Signature: \_\_\_\_\_

3. Approved by: President Office

Name of the President: **Dr. Teketel Forsido**

Date: **Dec. 04, 2015**

Signature: \_\_\_\_\_

The date it was signed and approved will be used as working document of  
the department