

*Department of Nutrition
and Food Technology*

Course Module

1- Compulsory University Requirements:

| Module designation | Communication skills in Arabic | | |
|--|---|----------------------|----------------------|
| Module level, if applicable | First year | | |
| Code, if applicable | ARB102 | | |
| Subtitle, if applicable | | | |
| Courses, if applicable | | | |
| Semester(s) in which the module is taught | First, second and summer | | |
| Person responsible for the module | Variable | | |
| Lecturer | Variable | | |
| Language | Arabic | | |
| Relation to curriculum | Compulsory Course can be taken any semester | | |
| Type of teaching, contact hours | 3 Credit Hours Lecture: 3 lectures | | |
| Workload | | Contact Hours | Private Study |
| | Lectures | 45 | 71 |
| | Exams | 4 | 32 |
| | Total | 49 | 101 |
| | Total hours = 150 | | |
| Credit points | 5 ECTS | | |
| Requirements according to the examination regulations | None | | |
| Recommended prerequisites | None | | |
| Module objectives/intended learning outcomes | Objectives: This three credit hours course aims to study short texts from the Holy Quran, the Prophet's Tradition, and verse and prose literature. This course also aims to analyze the aesthetic aspects of such texts in order to augment student's connection to their | | |

| Module designation | Communication skills in Arabic |
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| | <p>mother tongue language and expose students to its literature, vocabulary, characteristics, and structure.</p> <p>هذا المساق يغطي جانب نظري من اللغة وخصص له ثلاث ساعات معتمده. يقوم على تناول نصوص قصيرة من القرآن الكريم والحديث الشريف وكذلك الادب شعره ونثره وعلى الوقوف عند الجوانب الجمالية لهذه النصوص وذلك لتوثيق صلة الطالب بلغته وتمكينه من الاطلاع على جوانب ادبها والتعرف الى خصائصها وحسن توظيف مفرداتها وتراكيبها وإدراك طرق تنميتها والنهوض بها</p> <p>Learning outcomes:</p> <ol style="list-style-type: none"> 1. التأسيس لإدراك النصوص الأدبية وفهمها وإدراكها 2. تجديد بعض المصطلحات النقدية والنحوية واللغوية من ضمن المنهاج 3. أن يصبح الطالب قادرا على تفسير بعض الظواهر الأدبية والبلاغية والنحوية 4. ان يدرك الطالب سعة اللغة العربية وقدرتها على استيعاب المصطلحات والمفردات الجديدة 5. تقان فن الكتابة والتعبير بنوعيه الكتابي والشفوي |
| Content | <p>سورة هود: تفسير وتحليل التطبيقات اللغوية</p> <ol style="list-style-type: none"> 1. تطبيقات على سورة هود: الاستيعاب والمناقشة 2. تطبيقات على قصيدة ذو الاصبع العدوانى: الاستيعاب والمناقشة ، والتطبيقات اللغوية 3. المقامة البغدادية: تفسير وتحليل 4. تطبيقات على المقامة البغدادية: الاستيعاب والمناقشة 5. تطبيقات على قصيدة المتنبي: الاستيعاب والمناقشة ، والتطبيقات اللغوية 6. من كتاب كليلة ودمنة "القط والفأر": تفسير وتحليل 7. تطبيقات على نص كليلة ودمنة: الاستيعاب والمناقشة ، والتطبيقات اللغوية 8. قصيدة في السوق القديم للسياب: تفسير وتحليل 9. تطبيقات على قصيدة في السوق القديم: الاستيعاب والمناقشة ، والتطبيقات اللغوية 10. مقال لجبران خليل جبران "أحب من الناس العامل" تفسير وتحليل 11. تطبيقات على مقالة جبران: الاستيعاب والمناقشة ، والتطبيقات اللغوية 12. مراجعة عامة وشاملة |
| Study and examination requirements and forms of examination | <p><i>The final mark of the course consists of:</i></p> <p>Computer-based exams:</p> <ol style="list-style-type: none"> a. <i>First exam (30% of the final mark): composed of multiple- choice questions.</i> b. <i>Second exam (30% of the final mark): composed of multiple-choice questions.</i> <p><i>Final exam (40% of the final mark): composed of multiple- choice questions.</i></p> |
| Media employed | Power point presentations will constitute mainly the lectures |
| Reading list | Arabic Language 7th edition. Authored by several Arabic Teachers from the department of Humanities at JUST |

| Module designation | Leader and Social Responsibility | | |
|--|---|----------------------|----------------------|
| Module level, if applicable | First year | | |
| Code, if applicable | HSS110 | | |
| Subtitle, if applicable | | | |
| Courses, if applicable | | | |
| Semester(s) in which the module is taught | First, second and summer | | |
| Person responsible for the module | Department of Humanities | | |
| Lecturer | Variable | | |
| Language | Arabic | | |
| Relation to curriculum | Compulsory Course taken any semester | | |
| Type of teaching, contact hours | 3 Credit Hours Lecture: 3 lectures | | |
| Workload | | Contact Hours | Private Study |
| | Lectures | 45 | 60 |
| | Assignments | 0 | 11 |
| | Exams | 4 | 30 |
| | Total | 49 | 101 |
| | Total hours = 150 | | |
| Credit points | 5 ECTS | | |
| Requirements according to the examination regulations | None | | |
| Recommended prerequisites | None | | |
| Module objectives/intended learning outcomes | <p>Objectives: This course aims to define the concepts of homeland and citizenship to promote the notion of loyalty and belonging, and to stand on the role of the Hashemite family in the development of state facilities and the establishment of comprehensive national renaissance. It also introduces university environment and the draft of university code of conduct to guide students, especially in their first year, to discuss university violence, its causes, and appropriate treatment methods. In addition, it aims to instill the principle of moderation, acceptance of different opinions, rejection of</p> | | |

| Module designation | Leader and Social Responsibility |
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| | <p>violence, extremism and exaggeration in all its forms, and reinforce the embodiment of the principle of initiative in voluntary work and partnership with the community to activate the partnership between the university and the community and its positive impact on both sides.</p> <p>Learning outcomes: Having finished the course, students will be able to:</p> <ol style="list-style-type: none"> 1. Define the concept of homeland and to completely understand their duties/responsibilities as well as their rights 2. Fully understand the role of Hashemite's in developing modern Jordan 3. Understand the University Code of Conduct and the pertaining ethical issues 4. Accept the others opinion and live in harmony with the diversity and ethnicity of the university students 5. Reject violence and extremism in all its forms 6. Understand the social and moral benefits of voluntary work |
| Content | <ol style="list-style-type: none"> 1. The course is given as a collection of lectures, group work and workshops that cover the following topics; 2. National education, homeland and loyalty: this chapter helps students understand the concept of the homeland and loyalty as part of the national education theme. 3. Loyalty and belonging; Discussion of the meaning of loyalty to the homeland 4. History and the geography of Jordan: Discussion of the history of Jordan, its geography and natural resources 5. The role of Hashemite's in developing Jordan 6. The Political system in Jordan 7. University Environment and Student Counseling 8. Scribble of the university behavior and university violence 9. Health services and the healthy health practices 10. Scientific Research curriculum 11. Concepts of Voluntary work |
| Study and examination requirements and forms of examination | <p><i>The final mark of the course consists of:</i></p> <ol style="list-style-type: none"> 1. Written exams: <ol style="list-style-type: none"> a. <i>Midterm exam (40% of the final mark): composed of multiple-choice questions.</i> b. <i>Final exam (40% of the final mark): composed of multiple- choice questions</i> 2. Activities: <ol style="list-style-type: none"> a. <i>Class participation (10% of the total mark)</i> b. <i>Projects related to environment preservation (10%)</i> |
| Media employed | Projector, e-learning, power point presentations and whiteboard |

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| Module designation | Leader and Social Responsibility |
| Reading list | <ol style="list-style-type: none">1. National Education, authored by many department faculty.2. The Science of Social criminology authored by many of the teachers in the Department of Humanities at JUST |

| Module designation | Entrepreneurship and Innovation | | |
|--|---|----------------------|----------------------|
| Module level, if applicable | First year | | |
| Code, if applicable | HSS119 | | |
| Subtitle, if applicable | | | |
| Courses, if applicable | | | |
| Semester(s) in which the module is taught | First, second and summer | | |
| Person responsible for the module | Dr Mutawakil Ubaidat | | |
| Lecturer | Dr Mutawakil Ubaidat and others | | |
| Language | Arabic and English | | |
| Relation to curriculum | Compulsory Course can be taken any semester | | |
| Type of teaching, contact hours | 2 Credit Hours Lecture: 2 lectures | | |
| Workload | | Contact Hours | Private Study |
| | Lectures | 30 | 54 |
| | Assignments | 0 | 10 |
| | Exams and quizzes | 6 | 20 |
| | Total | 36 | 84 |
| | Total hours = 120 | | |
| Credit points | 4 ECTS | | |
| Requirements according to the examination regulations | None | | |
| Recommended prerequisites | None | | |

| Module designation | Entrepreneurship and Innovation |
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| Module objectives/intended learning outcomes | <p>Objectives: This course is an introductory course to entrepreneurship and creativity. Definition and challenges of entrepreneurship, creative thinking to do productive work projects, the link between creative ideas and available opportunities, feasibility studies, writing proposals, funding of projects, introduction of business profile, comparative measures of performance, analysis of business information, new opportunities, business objectives, evaluation of management and personnel, maintaining and strengthening existing business, overcoming weakness, operational plans, impact and management of change.</p> <p>Learning outcomes: The outcomes of this course are divided into six major outcomes that are covered by the material and lecture notes. Students at the end of the class should be able:</p> <ol style="list-style-type: none"> 1. To determine if entrepreneurship is an appropriate career choice for them 2. To learn ways of creativity enhancement 3. To learn how to protect intellectual property: patent, trademark, copyright 4. To learn the steps of a new business planning process 5. To learn how to conduct a feasibility analysis to determine the viability of a business concept and construct a business model accordingly 6. To learn writing a business plan |
| Content | <ol style="list-style-type: none"> 1. The world of the entrepreneur, entrepreneurial activity across the globe, characteristics of entrepreneurs, most important qualities of an entrepreneur, benefits of entrepreneurship 2. Drawbacks of entrepreneurship, feeding the entrepreneurial fire, the cultural diversity of entrepreneurship 3. The power of small businesses, avoiding the pitfalls of small business failure, assignment 1, creativity, innovation, and entrepreneurship, creativity: essential for survival 4. Creative thinking, right-brained-thinkers' skills, barriers to creativity 5. Enhancing organizational creativity, enhancing organizational creativity 6. The creative process, techniques for improving the creative process 7. Intellectual property protection; patent, trade mark, copyright, assignment 2 Chapter 2 8. Conducting a feasibility analysis and designing a business model; new business planning process |

| Module designation | Entrepreneurship and Innovation |
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| | 9. Idea assessment, elements of feasibility analysis, industry/market feasibility analysis 10. Porter's five forces model 11. Product or service feasibility analysis, financial feasibility analysis 12. Entrepreneur feasibility, developing and testing a business model, assignment3 13. Crafting a business plan, goals and benefits of a business plan, the three tests of a business plan: reality, competitive, and value tests 14. Elements of the business plan, the "5 Cs" of credit, assignment 4 |
| Study and examination requirements and forms of examination | The final mark of the course consists of: 1. Computer-based exams: a. Midterm exam (30% of the final mark): composed of multiple-choice questions. b. Final exam (40% of the final mark): composed of multiple-choice questions 2. Assignments and projects (20%): At least 4 assignments will be given during the course 3. Paper-based quizzes (10%): At least 5 quizzes will be given during the course |
| Media employed | 1. Students work individually on instructional materials, such as recorded lectures and power point presentations that will be uploaded on the e-learning system. 2. In-class sessions will be dedicated for students' inquiries and discussions. Furthermore, they will help students who are struggling with the instructional materials to progress. 3. Students have to attend online classes through the e-learning system and will have to answer a set of questions after each session they attended. |
| Reading list | Handouts distributed by course instructors |

| Module designation | Communication skills in English | | |
|--|--|---------------|---------------|
| Module level, if applicable | First year | | |
| Code, if applicable | LG 101 | | |
| Subtitle, if applicable | | | |
| Courses, if applicable | | | |
| Semester(s) in which the module is taught | First, second and summer | | |
| Person responsible for the module | Muneera Jaradat, Nisreen Azar, Asma, Al-Ghazu | | |
| Lecturer | Variable | | |
| Language | English | | |
| Relation to curriculum | Compulsory Course in 2nd semester of the first year | | |
| Type of teaching, contact hours | 3 Credit Hours Lecture: 3 lectures | | |
| Workload | | Contact Hours | Private Study |
| | Lectures | 45 | 71 |
| | Exams | 4 | 30 |
| | Total | 49 | 101 |
| | Total hours = 150 | | |
| Credit points | 5 ECTS | | |
| Requirements according to the examination regulations | ENG99 | | |
| Recommended prerequisites | | | |
| Module objectives/intended learning outcomes | <p>Objectives: This course is a general upper intermediate English course that aims at improving the four skills of language – listening, speaking, reading and writing. The first two skills – listening and speaking – are to be developed by the learners through being exposed to the language of lecturing. The skill of reading will be enhanced through the various presented reading skills. Also, the grammar and vocabulary sections target improving intact writing, the speaking fluency, the linguistic repertoire as well as the reading power.</p> | | |
| Content | <ul style="list-style-type: none"> • Reading: (introduction), skimming | | |

| Module designation | Communication skills in English |
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| | <ul style="list-style-type: none"> • Grammar: present simple & continuous, state verbs • Vocabulary: parts of speech • Reading: scanning • Grammar: past simple & continuous, used to • Vocabulary: phrasal verbs • Reading: how skimming can serve scanning • Grammar: present perfect, present perfect and past simple, present perfect continuous • Vocabulary: collocations, qualities of mind • Reading: guessing the meaning of unknown words from the context • Grammar: present perfect & present perfect continuous, past perfect, past perfect continuous • Vocabulary: make/ do/ have/ take (collocations) • Reading: signal words of addition, signal words of change • Grammar: time words for perfect tenses • Vocabulary: participial adjectives, extreme adjectives • Reading: signal words of cause and effect • Grammar: future simple, continuous, perfect, and perfect continuous • Vocabulary: synonyms, antonyms, quantifiers • Reading: text mapping; Grammar: passive voice • Vocabulary: have & have got • Reading: mapping longer passages • Grammar: causative passive • Vocabulary: hyponymy, meronymy • Reading: graphic aids, line graphs & bar graphs • Grammar: definite and non-definite articles • Vocabulary: collocations with get • Reading: graphic aids, pie charts & tables • Grammar: zero article • Vocabulary: collocations with mind • Reading: inferring; Vocabulary: idioms; Reading: paraphrasing |

| Module designation | Communication skills in English |
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| | <ul style="list-style-type: none"> • Reading: summarizing, clustering and review |
| Study and examination requirements and forms of examination | <p><i>The final mark of the course consists of:</i></p> <p>1. Written exams:</p> <ul style="list-style-type: none"> a. <i>First exam (25% of the final mark): composed of essay and multiple-choice questions.</i> b. <i>Second exam (25% of the final mark): composed of essay and multiple-choice questions.</i> c. <i>Final exam (40% of the final mark): composed of essay and multiple-choice questions.</i> <p>2. Participation (10%)</p> |
| Media employed | 53 videos followed by exercises all online on Edraak platform, discussion forum on the platform |
| Reading list | ----- |

| Module designation | Life Skills | | |
|--|--|---------------|---------------|
| Module level, if applicable | Second year | | |
| Code, if applicable | LG 103 | | |
| Subtitle, if applicable | | | |
| Courses, if applicable | | | |
| Semester(s) in which the module is taught | First, second and summer | | |
| Person responsible for the module | Dr. Nisreen Azar | | |
| Lecturer | Dr. Nisreen Azar and others | | |
| Language | English | | |
| Relation to curriculum | Compulsory Course in the 1st Semester of the second year | | |
| Type of teaching, contact hours | 2 Credit Hours Lecture: 2 lectures | | |
| Workload | | Contact Hours | Private Study |
| | Lectures | 30 | 56 |
| | Exams & Quizzes | 4 | 30 |
| | Total | 34 | 86 |
| | Total hours = 120 | | |
| Credit points | 4 ECTS | | |
| Requirements according to the examination regulations | None | | |
| Recommended prerequisites | None | | |
| Module objectives/intended learning outcomes | <p>Learning outcomes: The students who take this course are expected to:</p> <ol style="list-style-type: none"> 1. Define verbal and nonverbal communication 2. Demonstrate proper techniques when communicating in writing and demonstrate skills for improving conversational skills 3. Describe how to receive and deliver constructive criticism as well 4. Identify barriers of communication 5. Demonstrate techniques for the improvement of team work and group communication with the use of active communication skills to absorb cultural differences | | |

| Module designation | Life Skills |
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| | <p>6. Make better decisions and build critical thinking skills</p> <p>7. Increase engagement in communities as well as increase self-confidence</p> |
| Content | <p>Week 1: the importance of communication is stressed in this introductory lecture so that students can build up on their understanding of this concept</p> <p>Weeks 2&3: an introduction to communication; functions of communication, communication model, verbal and none verbal communication.</p> <p>Week 4, 5 and 6: In this week, the qualities and the effective technical writing will be discussed. Students will write with the assistance or their teacher a technical report</p> <p>Weeks 7&8: students will be introduced to writing ideal resumes and will be taught the techniques for a creative job hunt.</p> <p>Week 9; students will learn the process of decision making and problem-solving skills</p> <p>Week 10: students will practice communication skills in terms of speaking and listening. Each student will have to speak loudly and others have to listen and criticize.</p> <p>Week11; students will be taught the essence of team working and action planning techniques.</p> <p>Week 12; The teacher will review all these techniques and skills with the students prior to the final assessment.</p> |
| Study and examination requirements and forms of examination | <p>The final mark of the course consists of:</p> <p>1. Computer-based exams:</p> <ol style="list-style-type: none"> a. Midterm exam (45% of the final mark): composed of multiple-choice questions. b. Final exam (40% of the final mark): composed of multiple- choice questions <p>2. Paper-based quizzes (15%): At least 5 quizzes will be given during the course</p> |
| Media employed | <p>This is a blended course in which a portion of traditional face- to- face instruction is replaced by online learning.</p> <p>Students work individually on instructional materials, such as recorded lectures and power point presentations that will be uploaded on the e-learning system.</p> |

| Module designation | Life Skills |
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| | <p>In-class sessions will be dedicated for students' inquiries and discussions. Furthermore, they will help students who are struggling with the instructional materials to progress.</p> <p>Students have to work on online videos and electronic material that are uploaded on JUST E-Learning and will have to answer a set of questions after each session they attended.</p> |
| Reading list | <ol style="list-style-type: none"> 1. Bauer, T, Carpenter, M. and Erdogan, B.2012. <i>Management Principles</i>. Unnamed Publishers. 2. Beebe, A,S., Beebe, J,S and Redmond, M. 2008. <i>Interpersonal Communication, Relating to Others</i>. London: Pearson. 3. Behera, A. K. and Tripathy, B. K.2009. <i>Barriers to Effective Communication and How to overcome them</i>. Academe 4. Cheesebro, T., O'Connor, L. and Rios, F. 2007. <i>Communication Skills: Preparing for Career Success</i>. London: Pearson. 5. Gerson, S. 2006.<i>Writing That Works</i>. The USA: Kansas Curriculum Center. 6. McPheat, S.2012. <i>Advanced Communication Skills</i>. Frederiksberg: Ventus Publishing APS |

| Module designation | Military Sciences | | |
|--|---|----------------------|----------------------|
| Module level, if applicable | Second year | | |
| Code, if applicable | MS100 | | |
| Subtitle, if applicable | | | |
| Courses, if applicable | | | |
| Semester(s) in which the module is taught | First, second and summer | | |
| Person responsible for the module | Military science department | | |
| Lecturer | Variable | | |
| Language | Arabic | | |
| Relation to curriculum | Compulsory Course taken any semester | | |
| Type of teaching, contact hours | 3 Credit Hours Lecture: 3 lectures | | |
| Workload | | Contact Hours | Private Study |
| | Lectures | 42 | 75 |
| | Exercises | 3 | 6 |
| | Exams | 4 | 20 |
| | Total | 49 | 101 |
| | Total hours = 150 hours | | |
| Credit points | 5 ECTS | | |
| Requirements according to the examination regulations | None | | |
| Recommended prerequisites | None | | |
| Module objectives/intended learning outcomes | <p>Objectives: Military science and citizenship study material is considered as an organic extension of the education and teaching philosophy as it is a dimension of the national strategy of the Jordanian higher education, which takes into consideration the comprehensive national security concept in its traditional and social meaning. It deepens the loyalty values in the homeland's land, people, regime institutions and military and security agencies that leads toward qualifying students to undertake their future roles as a loyal citizen and glorifying and sustaining the national feeling, loyalty, to be proud</p> | | |

| Module designation | Military Sciences |
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| | <p>of the Jordanian fixed values and to trust the military and security systems until they achieve the positive change which sustain the security and stability of the country. In addition, it provides students with the basic information regarding building and developing the Hashemite kingdom of Jordan, its armed forces, its security agencies and showing its abilities in protecting the nation high interests. Moreover, this course has a role in developing and serving local Arabic and international communities as well as the comprehensive security awareness in the operational and psychological fields, the danger of drug, terrorism and the meanings of loyalty and citizenship and to prepare and mobilize the national resources.</p> <p>Having finished the course, students will be able to:</p> <ol style="list-style-type: none"> 1. Demonstrate knowledge on the establishment of the Jordan and its armed forces, in addition to acquainting knowledge on the different types of weapons they possess 2. Demonstrate knowledge on the rules of the Jordan Military in keeping peace around the world, and possessing knowledge on neighboring countries and the strength of their military forces 3. Demonstrate understanding of the Jordan Military forces in stabilizing the country from inside and help in building the country's capacity. 4. Demonstrate understanding of the rule of citizens in keeping the country safe, clean and people live in harmony. |
| Content | <p>Part I: Establishment and development of the Hashemite Kingdome of Jordan and Jordan armed forces-Arab military</p> <ol style="list-style-type: none"> 1. Establishment and development of the Hashemite Kingdome of Jordan 2. Establishment and development of Jordan armed forces 3. Maneuver weapons 4. Super weapons 5. Services unites. 6. Royal Jordanian armed forces <p>Part II: Roles of Jordan armed forces –Arab army (JAF)</p> <ol style="list-style-type: none"> 1. National and humanitarian rules 2. Great Arab revolt 3. Israeli-Arab wars 4. JAFs role in peace keeping missions. <p>Part III: JAFs National Role</p> <ol style="list-style-type: none"> 1. JAFs role in national comprehensive development 2. Military woman role in JAF 3. Economic social association of retired servicemen and veterans 4. King Abdullah II design and development bureau (KADDB) <p>Part IV: Security Agencies development</p> |

| Module designation | Military Sciences |
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| | <ol style="list-style-type: none"> 1. Public security directorate 2. General intelligence department 3. Gendarmerie Forces 4. Civil defense <p>Part V: Citizenship and challenges</p> <p><i>Citizenship</i></p> <ol style="list-style-type: none"> 1. Citizenship concept 2. Loyalty 3. Al-Hashimieens philosophy in the country management 4. King Abdullah II bin Al Hussein’s supervision toward civil society building 5. Jordan national identity 6. Jordan national security concept 7. Mobilizing national resources <p><i>Challenges</i></p> <ol style="list-style-type: none"> 1. Hyperbolism and extremism 2. Communal violence 3. Drugs |
| Study and examination requirements and forms of examination | <p><i>The final mark of the course consists of:</i></p> <ol style="list-style-type: none"> 1. Written exams: <ol style="list-style-type: none"> a. <i>Midterm exam (30% of the final mark): composed of multiple-choice questions.</i> b. <i>Final exam (40% of the final mark): composed of multiple-choice questions.</i> 2. Visits and extracurricular activities (30%) |
| Media employed | Projector, e-learning, power point presentations and white board |
| Reading list | Class notes written and organized by Military department |

2- Faculty Requirements

| Module designation | General Biology | | |
|--|--|---------------|---------------|
| Module level, if applicable | First year | | |
| Code, if applicable | HSS103BT | | |
| Subtitle, if applicable | | | |
| Courses, if applicable | | | |
| Semester(s) in which the module is taught | First and second semesters | | |
| Person responsible for the module | Variable | | |
| Lecturer | Variable | | |
| Language | English | | |
| Relation to curriculum | Compulsory course in the first semester of the first year | | |
| Type of teaching, contact hours | 3 Credit Hours Lecture: 3 lectures | | |
| Workload | | Contact Hours | Private Study |
| | Lectures | 45 | 71 |
| | Exams | 4 | 30 |
| | Total | 49 | 101 |
| | Total hours = 150 | | |
| Credit points | 5 ECTS | | |
| Requirements according to the examination regulations | The student shall be debarred from the final examination if the percentage of his absence exceeds (20%) out of the total lectures of the course. The student who is debarred from the examination because of absence is considered as a failure in the course | | |
| Recommended prerequisites | None | | |
| Module objectives/intended learning outcomes | <ol style="list-style-type: none"> 1. Describe the structure, characteristics and functions of carbohydrates, lipids, proteins and nucleic acids. 2. Become familiar with basic unit of life, how prokaryotes and eukaryotes are different and identify organelles and structures in animal and plant cells and how they differ from each other. 3. Analyze and explain the processes associated with and the role of the cell membrane in the processes of osmosis, diffusion and transport. | | |

| Module designation | General Biology |
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| | <ol style="list-style-type: none"> 4. Explain how metabolic pathways are performed in plants and animals in the form of cellular respiration. 5. Describe the molecular bases of cell cycle and how mitosis and meiosis are differentiated in addition to their goals and outcomes. 6. Define and apply the principles of Mendelian genetics and its modern extensions to the unity and diversity of life. 7. Understand the molecular and chromosomal basis of heredity. 8. Describe the anatomical structure and physiological functions of tissues and organ systems of the human body. |
| Content | <p>Biological Macromolecules and Lipids Macromolecules are polymers, built from monomers Carbohydrates serve as fuel and building material Lipids are a diverse group of hydrophobic molecules Proteins include a diversity of structures, resulting in a wide range of functions Nucleic acids store, transmit, and help express hereditary information Genomics and proteomics have transformed biological inquiry and applications</p> <p>Cell Structure and Function Biologists use microscopes and the tools of biochemistry to study cells Eukaryotic cells have internal membranes that compartmentalize their functions The eukaryotic cell's genetic instructions are housed in the nucleus and carried out by the ribosomes The endomembrane system regulates protein traffic and performs metabolic functions in the cell Mitochondria and chloroplasts change energy from one form to another The cytoskeleton is a network of fibers that organizes structures and activities in the cell Extracellular components and connections between cells help coordinate cellular activities</p> <p>Cell Membranes Cellular membranes are fluid mosaics of lipids and proteins Membrane structure results in selective permeability Passive transport is diffusion of a substance across a membrane with no energy investment Active transport uses energy to move solutes against their gradients Bulk transport across the plasma membrane occurs by exocytosis and endocytosis</p> <p>Cell Respiration Catabolic pathways yield energy by oxidizing organic fuels Glycolysis harvests chemical energy by oxidizing glucose to pyruvate After pyruvate is oxidized, the citric acid cycle completes the energy-yielding oxidation of organic molecules During oxidative phosphorylation, chemiosmosis couples electron transport to</p> |

| Module designation | General Biology |
|--|--|
| | <p>ATP synthesis Fermentation and anaerobic respiration enable cells to produce ATP without the use of oxygen Glycolysis and the citric acid cycle connect to many other metabolic pathways</p> <p>Mitosis Most cell division results in genetically identical daughter cells The mitotic phase alternates with interphase in the cell cycle The eukaryotic cell cycle is regulated by a molecular control system</p> <p>Sexual Life Cycle and Meiosis Offspring acquire genes from parents by inheriting chromosomes Fertilization and meiosis alternate in sexual life cycles Meiosis reduces the number of chromosome sets from diploid to haploid Genetic variation produced in sexual life cycles contributes to evolution</p> <p>Mendelian Genetics Mendel used the scientific approach to identify two laws of inheritance Probability laws govern Mendelian inheritance Inheritance patterns are often more complex than predicted by simple Mendelian genetics Many human traits follow Mendelian patterns of inheritance</p> <p>Nucleic Acids and Inheritance DNA is the genetic material Many proteins work together in DNA replication and repair A chromosome consists of a DNA molecule packed together with proteins</p> |
| Study and examination requirements and forms of examination | <p>First Exam: 30% Second Exam: 30% Final exam: 40%</p> |
| Media employed | <p>Direct lectures using PowerPoint slides, whiteboard for instruction of the theoretical parts and E-learning Moodle.</p> |
| Reading list | <p>Biology: A global Approach, (11th Edition), Campell, Urry, Cain, Wasserman, Minorsky, Reece. Pearson Education Inc., 2018.</p> |

| Module designation | General Biology Laboratory | | |
|--|--|----------------------|----------------------|
| Module level, if applicable | First Year | | |
| Code, if applicable | BT 107 | | |
| Subtitle, if applicable | | | |
| Courses, if applicable | | | |
| Semester(s) in which the module is taught | First, second and summer | | |
| Person responsible for the module | Bayen Mahawreh | | |
| Lecturer | TA's | | |
| Language | English | | |
| Relation to curriculum | Compulsory course in the first semester of the first year | | |
| Type of teaching, contact hours | 1 Credit Hours Lab session: 1 Lab | | |
| Workload | | Contact Hours | Private Study |
| | Lab session | 42 | 15 |
| | Reports | 0 | 15 |
| | Exams & Quizzes | 3 | 15 |
| | Total | 45 | 45 |
| | Total hours = 90 | | |
| Credit points | 3 ECTS | | |
| Requirements according to the examination regulations | HSS103BT or concurrent | | |
| Recommended prerequisites | | | |
| Module objectives/intended learning outcomes | <p>Objectives: This course is designed to introduce students to the basic concept of biology as a discipline. An overview of the microscope, different cell types, essential molecules, cell divisions, anatomy of the plant and human body with a wide range of laboratory experiments related to these topics where students are required to experience their ability in doing experiments, synthesize results and draw conclusions from their own work.</p> <p>Learning outcomes:</p> | | |

| Module designation | General Biology Laboratory |
|---------------------------|--|
| | <p>Having finished the course lectures and practical work, students will be able to:</p> <ol style="list-style-type: none"> 1. Discuss the main concepts of biology. 2. Describe the structural and functional properties of different cell types among living organisms. 3. Explore many biological activities within living organisms such as, respiration, enzymatic reactions, molecules transporting and cell division with the concepts of genetics and inheritance. 4. Examine representative models and slides. 5. Perform experiments; dealing with laboratory materials, tools and instruments. 6. Ability to analyze and solve practical problems. 7. Ability to organize group work, implement team and communication skills. |
| Content | <p>Lab Safety and Microscopy General guidelines, precautions and instructions, concepts of the microscope, microscope handling and caring, parts of the compound microscope, viewing prepared slides under the compound microscope, prepared and viewing wet mount slides, dissecting microscope, viewing object under the dissecting microscope.</p> <p>Cell Structure and Function Types of cells, prokaryotic and eukaryotic cells, main differences, structural compartments and their main function, studying a representative model of animal, plant, bacterial and paramecium cells, preparing wet mount slides of animal and plant cells.</p> <p>Macromolecules and Living Things Carbohydrates, fats and lipids, proteins, vitamin C, Benedict test for reducing sugar, Lougl's for starch, Biuret test for peptide bonds, solubility test and vitamin C concentration.</p> <p>Enzyme Activity Enzymes function, enzyme action, enzyme model, factors affecting enzymes activity, Isolation of the catalase enzyme, enzyme activity as a function of substrate concentration, enzyme activity as a function of enzyme concentration, enzyme activity as a function of temperature, enzyme activity as a function of pH.</p> <p>Cellular Respiration and Fermentation Types of cellular respiration, sites and products of the respirations, carbon dioxide liberation, water liberation, heat of respiration, dehydrogenase activity, anerobic respiration of yeast cells.</p> <p>Diffusion and Osmosis Molecules transporting pathways, diffusion direction, factors affecting diffusion, diffusion of gases, diffusion of molecules through a selective</p> |

| Module designation | General Biology Laboratory |
|---------------------------|--|
| | <p>permeable membrane, osmosis, definition and direction, tonicity, osmotic behavior in animal and plants cells.</p> <p>Mitosis and Meiosis Purposes of cells division, the cell cycle, mitosis, stages of mitosis, main events of mitosis, cytokinesis, cell cycle in plant cells, meiosis, stages of meiosis I and II, main events of meiosis, differences of meiosis and mitosis, prepared slide of mitosis in plant cells.</p> <p>Human Genetics Main concepts in genetics, DNA structure, RNA structure, inheritance pathways in human, autosomal inheritance, sex-linked inheritance, sex affected traits, ABO blood grouping, determining your blood type.</p> <p>Plant tissues Plant tissues, meristematic tissues, permeant tissues, complex permeant tissues, viewing prepared slides of plant tissues.</p> <p>Plant Organs Vegetative organs, root anatomy, stem anatomy, the woody dicot stem anatomy, leaf anatomy, reproductive organs of the plant, the flower parts, viewing prepared slides of the plant organs.</p> <p>Animal Tissues Animal tissue types, epithelial tissue, connective tissue, muscular tissue, nervous tissue, viewing prepared slides of animal tissues.</p> <p>Animal Organs Human skin, intestine, kidney, liver, spinal cord, trachea, viewing prepared slides of animal organs.</p> <p>Animal Systems Human system overview, cardiovascular system, digestive system, reproductive system, muscular system, respiratory system, nervous system, skeletal system, urinary system, sense organs.</p> <p>Reports: Solving problems and questions about the conducted experiments.</p> |

| Module designation | General Biology Laboratory |
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| Study and examination requirements and forms of examination | <p>The final mark of the course consists of:</p> <ol style="list-style-type: none"> 1. Computer-based exams: <ol style="list-style-type: none"> a. Midterm exam (40% of the final mark): composed of multiple-choice questions on the content of the lectures and practical works. b. Final exam (40% of the final mark): composed of multiple-choice questions on the content of the lectures and practical work. 2. Quizzes (10% of the final mark): 6 quizzes composed of multiple-choice, true/false or fill in the blank questions. 3. Reports (10% of the final mark): 12 reports with certain requirements related to each experiment filled with the results of the practical work. |
| Media employed | <p>Lecture: Power point presentations and whiteboard. Practical work: Demonstration of the experiments by the lecturer and presenting objects and materials for the students.</p> |
| Reading list | <p>Manual of General Biology. Department of Biotechnology and Genetics Engineering, 2016- 2017.</p> |

| Module designation | General Chemistry | | |
|--|---|---------------|---------------|
| Module level, if applicable | First Year | | |
| Code, if applicable | HSS103CHEM | | |
| Subtitle, if applicable | | | |
| Courses, if applicable | | | |
| Semester(s) in which the module is taught | First and Second semester | | |
| Person responsible for the module | Dr. Ahmad Gharaibeh | | |
| Lecturer | Dr. Ahmad Gharaibeh | | |
| Language | English | | |
| Relation to curriculum | Compulsory course in the first semester of the first year | | |
| Type of teaching, contact hours | 3 Credit Hours Lecture: 3 lectures | | |
| Workload | | Contact Hours | Private Study |
| | Lectures | 45 | 81 |
| | Exams | 4 | 20 |
| | Total | 49 | 101 |
| | Total hours = 150 | | |
| Credit points | 5 ECTS | | |
| Requirements according to the examination regulations | None | | |
| Recommended prerequisites | None | | |
| Module objectives/intended learning outcomes | <p>Upon successful completion of this course, students should be able to:</p> <ol style="list-style-type: none"> 1. Perform stoichiometric calculations with units and applying rules of significant figures 2. Know the periodic trends and different types of chemical bonds 3. Know the different gas laws and the general gas law and their applications and perform calculations 4. involving gas phase reactions. Know properties of solutions and colligative properties 5. Know the fundamentals of chemical kinetics, rate law, reaction order, and rate-temperature relationship | | |

| Module designation | General Chemistry |
|---------------------------|---|
| | Know the chemistry of acids and bases, pH calculations, buffer calculations, and acid-base properties of salts. |
| Content | <ul style="list-style-type: none"> • Matter & Measurements <ul style="list-style-type: none"> 1.4 Units of Measurement 1.5 Uncertainty in Measurement 1.6 Dimensional Analysis • Atoms, Molecules, and Ions <ul style="list-style-type: none"> 2.5 The Periodic Table 2.7 Ions and Ionic Compounds 3. Stoichiometry: Calculations with Chemical Formula and Equations <ul style="list-style-type: none"> 3.4 Avogadro's Number and the Mole Quantitative Information from Balanced Equation 3.7 Limiting Reactants • Aqueous Reactions and Solution Stoichiometry <ul style="list-style-type: none"> 4.5 Concentrations of Solutions 4.6 Solution Stoichiometry and Chemical Analysis • Basic Concepts of Chemical Bonding <ul style="list-style-type: none"> 8.1 Chemical Bonds, Lewis Symbols, and the Octet Rule 8.2 Ionic Bonding (includes Ionic Radius Trends in Chapter 7-section 7.3) 8.3 Covalent Bonding 8.4 Bond Polarity and Electronegativity • Gases <ul style="list-style-type: none"> 10.2 Pressure 10.3 The Gas Laws 10.4 The Ideal-Gas Equation 10.5 Further Applications of the Ideal-Gas Equation 10.6 Gas Mixture and Partial Pressures 10.8 Molecular Effusion & Diffusion • Physical Properties of Solutions <ul style="list-style-type: none"> 13.4 Ways of Expressing Concentration 13.5 Colligative Properties • Chemical Kinetics <ul style="list-style-type: none"> 14.1 Factors Affecting Reaction Rates 14.2 Reaction Rates 14.3 Concentration and Rate Laws 14.4 The Change of Concentration with Time 14.5 Temperature and Rate • Acid-Base Equilibria <ul style="list-style-type: none"> 16.1 Arrhenius Definition of Acids & Bases 16.2 Bronsted-Lowry Acids & Bases 16.3 The Autoionization of Water 16.4 The pH Scale 16.5 Strength of Acids & Bases 16.6 Weak Acids 16.7 Weak Bases |

| Module designation | General Chemistry |
|--|--|
| | 16.8 Relationship Between K_a & K_b 16.9 Acid-Base Properties of Salt Solutions 16.11 Lewis Acids & Bases • Additional Aspects of Aqueous Equilibria 17.1 The Common-Ion Effect 17.2 Buffered Solutions • Revision |
| Study and examination requirements and forms of examination | First Exam 30% Second Exam 30% Final Exam 40% |
| Media employed | PowerPoint slides, E-Learning Moodle, and Lecture Notes |
| Reading list | Chemistry: The Central Science. Brown, LeMay, Bursten, Murphy, & Woodward. 10th Edition |

| Module designation | General Chemistry Laboratory | | |
|--|--|---------------|---------------|
| Module level, if applicable | First Year | | |
| Code, if applicable | CHEM107 | | |
| Subtitle, if applicable | | | |
| Courses, if applicable | | | |
| Semester(s) in which the module is taught | First, second and summer | | |
| Person responsible for the module | Mr. Ibrahim Jawarneh | | |
| Lecturer | Mr. Ibrahim Jawarneh and others | | |
| Language | English | | |
| Relation to curriculum | Compulsory course in the first semester of the first year | | |
| Type of teaching, contact hours | 1 Credit Hours Lab session: 1 Lab | | |
| Workload | | Contact Hours | Private Study |
| | Lab session | 42 | 15 |
| | Lab reports | 0 | 15 |
| | Exams & Quizzes | 3 | 15 |
| | Total | 45 | 45 |
| | Total hours = 90 | | |
| Credit points | 3 ECTS | | |
| Requirements according to the examination regulations | HSS103CHEM or concurrent | | |
| Recommended prerequisites | | | |
| Module objectives/intended learning outcomes | <p>Objectives:</p> <p>This course aims to teach students the basic principles of general chemistry. The first part of the course will cover the fundamental aspects of thermochemistry, the nature of energy, enthalpies and the laws of chemical thermodynamics. The second part will cover the properties of solutions, the chemical kinetics and the third part of the course will cover chemical equilibrium, acids base equilibria, additional aspects of aqueous equilibria and electrochemistry to familiarize the students the main concepts of advance course of general chemistry knowledge.</p> | | |

| Module designation | General Chemistry Laboratory |
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| | <p>The course will be frequently illustrated with examples linked to other scientific disciplines, in particular to the field of life material sciences.</p> <p>Learning outcomes: Having finished the course lab sessions, students will be able to:</p> <ol style="list-style-type: none"> 1. Develop reasoning and problem – solving skills including the ability to identify 2. Pertinent variables, recognize qualitative trends in data , determine what , if any quantitative trends in data , determine what , if any , quantitative relationships exist , and test the validity of conclusions. 3. Master the basic laboratory skills need to enter advanced chemistry courses. 4. Correlate the day–to–day observation with chemistry experiment. 5. Exhibit a basic knowledge of physical properties of chemical reactions. |
| Content | <ol style="list-style-type: none"> 1. Laboratory Safety 2. Density 3. Physical Separation of mixture 4. Limiting Reactant 5. Chemicals in everyday life 6. Colligative Properties 7. Calorimetry 8. Acid–base titration 9. Determination of a rate law 10. Quantitative yield of redox reaction 11. Quantitative analysis of Cations |
| Study and examination requirements and forms of examination | <p>The final mark of the course consists of:</p> <p>Computer-based exams:</p> <ol style="list-style-type: none"> a. Midterm exam (40% of the final mark): composed of multiple-choice questions. b. Final exam (40% of the final mark): composed of multiple- choice questions. <p>Lab reports:</p> <ol style="list-style-type: none"> c. Reports (20% of the final mark): Description, results and conclusions about lab experiments |
| Media employed | <p><u>Lab session:</u> demonstration, e-learning and whiteboard</p> <p><u>Exercise:</u> Examples and solved problems of course activities will be announced</p> |
| Reading list | <p>CHEMISTRY: The Central Science 12th Edition by Brown, LeMay, Bursten, Murphy and Woodward 2012</p> |

| Module designation | General Physics | | |
|--|--|---------------|---------------|
| Module level, if applicable | First Year | | |
| Code, if applicable | HSS103PHY | | |
| Subtitle, if applicable | | | |
| Courses, if applicable | | | |
| Semester(s) in which the module is taught | First and Second semester | | |
| Person responsible for the module | Prof. Ahmad Alsaad | | |
| Lecturer | Prof. Ahmad Alsaad and others | | |
| Language | English | | |
| Relation to curriculum | Compulsory course in the second semester of the first year | | |
| Type of teaching, contact hours | 3 Credit Hours Lecture: 3 lectures | | |
| Workload | | Contact Hours | Private Study |
| | Lectures | 45 | 71 |
| | Exams | 4 | 30 |
| | Total | 49 | 101 |
| | Total hours = 150 | | |
| Credit points | 5 ECTS | | |
| Requirements according to the examination regulations | None | | |
| Recommended prerequisites | None | | |
| Module objectives/intended learning outcomes | <p>Upon successful completion of this course, students should be able to:</p> <ol style="list-style-type: none"> 1. Understanding and solving problems in motion in on and two dimensions 2. Understanding and solving problems in Newton's laws 3. Understanding and solving problems in mechanical energy 4. Understanding and solving problems in temperature and heat 5. Understanding and solving problems in fluid mechanics 6. Understanding and solving problems in vibrations and waves 7. Understanding Static electricity 8. Understanding Circuits 9. Understanding magnetism | | |

Content

Ch. 2: Describing Motion: Kinematics in one dimension: Reference frames and Displacement, Average velocity, Instantaneous velocity, Acceleration, Motion at constant acceleration, Solving problems, Falling Objects. **2.1 (Pg. 22), 2.2 (Pg. 23), 2.3 (Pg. 25), 2.4 (Pg. 26), 2.5 (Pg. 28), 2.6 (Pg. 30) and 2.7 (Pg. 33)**

Ch. 3: Kinematics in Two Dimensions; Vectors: Vectors and Scalars, Addition of Vectors-Graphical Methods, Subtraction of Vectors, and Multiplication of a Vector by a Scalar, Multiplication of vectors (Scalar and vector products), Adding Vectors by Components. **3.1 (Pg. 50), 3.2 (Pg. 50), 3.3 (Pg. 52), 3.4 (Pg. 53)**

Ch. 4: Dynamics: Newton's Laws of Motion: Newton's First Law of Motion, Newton's Second Law of Motion, Newton's Third First Law of Motion, Weight-the Force of Gravity; and the Normal Force, Solving Problems with Newton's Laws: Free Body Diagrams, Problems Involving Friction, Inclines. **4.2 (Pg. 76), 4.4 (Pg. 78), 4.5 (Pg. 81), 4.6 (Pg. 84), 4.7 (Pg. 87), 4.8 (Pg. 93)**

Ch. 6: Work and Energy: Work done by a constant force, Kinetic energy, and the Work-Energy Principle, potential energy. **6.1 (Pg. 138), 6.3 (Pg. 142), 6.4 (Pg. 145)**

Ch. 8: Rotational Motion: Torque. **8.4 (Pg. 206).**

Ch. 9 Static Equilibrium; Elasticity and Fracture: The Concept of Equilibrium, Solving Statics Problems, Elasticity; Stress. **9.1 (Pg. 231), 9.2 (Pg. 233), 9.3 (Pg. 238), 9.3 (Pg. 241)**

Ch. 10: Fluids: Pressure in fluids, Atmospheric Pressure and Gauge Pressures, Buoyant and Archimedes' Principle, Fluids in Motion; Flow Rate and the Equation of Continuity; Streamline Flow, Bernoulli's Equation, Static Consequences of Bernoulli's Equation, Applications of Bernoulli's Principle. **10.3 (Pg. 262), 10.4 (Pg. 264), 10.7 (Pg. 268), 10.8 (Pg. 272), 10.9 (Pg. 274)**

Ch. 11: Vibrations and Waves: Wave Motion, Speed of Longitudinal waves. **11.7 (Pg. 305), 11.8 (Pg. 307)**

Ch. 12: Sound: Characteristic of sound, Intensity of sound: Decibels, The Ear and Its Response; Loudness. **12.1 (Pg. 328), 12.2 (Pg. 331), 12.3 (Pg. 334)**

Ch. 16: Electric Charge and Electric Field: Coulombs Law, Solving Problems Involving Coulombs Law and Vectors, The Electric Field, Field Lines. **16.5 (Pg. 447), 16.6 (Pg. 450), 16.7 (Pg. 453), 16.8 (Pg. 457)**

Ch.17: Electric Potential: Electric Potential and Potential Energy, Relation between Electric Potential and Electric Field, Electric Potential Due to Point Charges, Capacitance, Stored of Electric Energy. **17.1 (Pg. 474), 17.2 (Pg. 477), 17.5 (Pg. 479), 17.7 (Pg. 482), 17.9 (Pg. 486)**

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| | <p>Ch. 18: Direct Currents: Electric Current (No internal resistance), Ohm's law Resistance and Resistors (No temperature effect), Resistivity, 18.2 (Pg. 504), 18.3 (Pg. 505), 18.4 (Pg. 508)</p> <p>Ch. 19 DC Circuits: Resistors in Series and Parallel 19.2 (Pg. 528)</p> <p>Ch. 20: Magnetism: Magnets and Magnetic Field, Electric Currents Produce Magnetic Field, Force on a Electric Charge Moving in a Magnetic Field, Magnetic Force on a Current-Carrying Wire, Magnetic Fields Produced by Currents</p> |
| Study and examination requirements and forms of examination | <p>First Exam 30%</p> <p>Second Exam 30%</p> <p>Final Exam 40%</p> |
| Media employed | <p>PowerPoint slides, E-learning Moodle, and lecture notes.</p> |
| Reading list | <ol style="list-style-type: none"> 1. College Physics by Knight, Jones, and Field 2. College Physics by Serway& Faughn. 3. Contemporary College Physics by Jones & Childers. 4. Physics by Kane and Sternheim 3rd Edition, John Wileys & Sons, New York, 1988. |

| Module designation | Calculus 2 (for biological sciences) | | |
|--|---|----------------------|----------------------|
| Module level, if applicable | Second Year | | |
| Code, if applicable | HSS102MATH | | |
| Subtitle, if applicable | | | |
| Courses, if applicable | | | |
| Semester(s) in which the module is taught | First, second and summer | | |
| Person responsible for the module | Dr Amer Darweesh | | |
| Lecturer | Dr Amer Darweesh and others | | |
| Language | English | | |
| Relation to curriculum | Compulsory course in the first semester of the second year | | |
| Type of teaching, contact hours | 3 Credit Hours Lecture: 3 lectures | | |
| Workload | | Contact Hours | Private Study |
| | Lectures | 45 | 41 |
| | Exercises | 0 | 40 |
| | Exams | 4 | 20 |
| | Total | 49 | 101 |
| | Total hours = 150 | | |
| Credit points | 5 ECTS | | |
| Requirements according to the examination regulations | None | | |
| Recommended prerequisites | None | | |
| Module objectives/intended learning outcomes | <p>This hour course introduces students to exponential and logarithmic functions, trigonometric functions, techniques of integration and integral and its application</p> <p>Learning outcomes:</p> <p>By the end of the course, students should be able to:</p> <ol style="list-style-type: none"> 1. Analyze linear functions and inequalities and draw them. 2. Manipulate limits of functions. 3. Apply the derivatives and use them in some applications. 4. Perform integration via the methods of substitution and by parts. | | |

| Module designation | Calculus 2 (for biological sciences) |
|--|---|
| | 5. Find volumes generated by revolving areas under curves. |
| Content | <p>1.1 Real Number System 1.2 Sets and their Representations 1.3 Functions 1.4 Linear Functions 1.5 Linear Inequalities 1.6 Other Simple Functions 1.7 More on Functions: Composite Functions 1.8 Limits as x Goes to Infinity</p> <p>2.1 Increments and Rates 2.2 Limits 2.3 More on Limits 2.4 Continuous Functions 2.5 The Derivative 2.6 Derivative of Power Functions 2.7 Product and Quotient Rules 2.8 Derivatives of Composite Functions 2.9 Higher</p> <p>3.1 Exponential Functions 3.2 Inverse Functions and Logarithms 3.4 Natural Logarithms and Exponential</p> <p>5.2 Trigonometric Functions 5.3 Derivatives of Trigonometric Functions</p> <p>6.1 Anti-derivatives 6.2 Method of substitution; 6.4 Method of Partial Fractions 6.6 Integration by Parts.</p> <p>7.3 Definite Integrals 7.4 More on areas 7.5 Volumes of Revolutions</p> |
| Study and examination requirements and forms of examination | The final mark of the course consists of: <ol style="list-style-type: none"> 1. First written exam (30%) 2. Second written exam (30%) 3. Final written exam (40%) |
| Media employed | Students mainly will be lectured using chalk board and students can benefit from the office for math counseling that was opened in the math department for helping students registered for their courses |

| Module designation | Calculus 2 (for biological sciences) |
|---------------------------|---|
| Reading list | <p>Mathematics for the Biological science, J.C. Arya and R. W. Lardner, first edition, Prentic-Hill</p> <p>References and Supplement Materials:</p> <ol style="list-style-type: none">1. Calculus for the Life Sciences by R. N. Greenwell et al, Pearson; 2 ed., 2014.2. Calculus with Applications for the Life Sciences 1st Edition, by R. N. Greenwell et al, Pearson; 2 ed., 2002.3. Calculus for the Life Sciences by M. L. Bittinger et al, Pearson; 1 ed., 2008. |

| Module designation | Principles of Agricultural Economics | | |
|--|---|---------------|---------------|
| Module level, if applicable | Second Year | | |
| Code, if applicable | PP204 | | |
| Subtitle, if applicable | | | |
| Courses, if applicable | | | |
| Semester(s) in which the module is taught | First and Second semesters | | |
| Person responsible for the module | Part time lecturer | | |
| Lecturer | Part time lecturer | | |
| Language | English | | |
| Relation to curriculum | Faculty compulsory course in the second semester of the second year | | |
| Type of teaching, contact hours | 3 Credit Hours Lecture: 3 lectures | | |
| Workload | | Contact Hours | Private Study |
| | Lecture | 45 | 66 |
| | Assignments | 0 | 15 |
| | Exams | 4 | 20 |
| | Total | 49 | 101 |
| | Total hours = 150 | | |
| Credit points | 5 ECTS | | |
| Requirements according to the examination regulations | None | | |
| Recommended prerequisites | NF 281 Principles of Nutrition Or NF 275 Principles of Food Science | | |
| Module objectives/intended learning outcomes | <p>Upon successful completion of this course, the students should be able to:</p> <ol style="list-style-type: none"> 1. Understanding the gain from trade, e.g., increased choice of the consumers, larger markets for farms and be able to distinguish between absolute and comparative advantage. 2. Explain the function of price mechanism. 3. Examine how prices respond to changes in consumer preferences and provide incentives to producers. | | |

| Module designation | Principles of Agricultural Economics |
|---------------------------|--|
| | <ol style="list-style-type: none"> 4. Analyze the advantages and disadvantages of the free-market economy and why there are mixed economies. 5. Understand the distinction between the shift and movement along demand and supply curve, and the causes of such movements and shift. 6. Define measures and interpret price elasticity of supply, price, income and cross elasticity of demand, and understand the distinction between normal and inferior goods. 7. Apply they price mechanism in markets, such as commodities, agriculture, housing, labor and exchange rate. 8. Understand the impact of new supplier and /or new product on price and output. 9. Use supply and demand analysis to demonstrate the impact and incidence of taxes and subsidies on consumer, producer, and government. |
| Content | <ol style="list-style-type: none"> 1. Ten Principles of Economics: How People Make Decisions <ul style="list-style-type: none"> • Principle 1: People Face Trade-offs • Principle 2: The Cost of Something Is What You Give Up to Get It • Principle 3: Rational People Think at the Margin • Principle 4: People Respond to Incentives • Principle 5: Trade Can Make Everyone Better Off • Principle 6: Markets Are Usually a Good Way to Organize Economic Activity • Principle 7: Governments Can Sometimes Improve Market Outcomes • How the Economy as a Whole Work • Principle 8: A Country’s Standard of Living Depends on Its Ability to Produce Goods and Services • Principle 9: Prices Rise When the Government • Principle 10: Society Faces a Short-Run Trade-off between Inflation and Unemployment 2. Thinking Like an Economist <ul style="list-style-type: none"> • The Economist as Scientist • The Economist as Policy Adviser • Why Economists Disagree 3. Interdependence and the Gains from Trade <ul style="list-style-type: none"> • A Parable for the Modern Economy • Supply • Supply and Demand Together • How Prices Allocate Resources • The Market Forces of Supply and Demand 4. Elasticity and Its Application <ul style="list-style-type: none"> • The Elasticity of Demand • The Elasticity of Supply |

| Module designation | Principles of Agricultural Economics |
|--|---|
| | <ul style="list-style-type: none"> • Three Applications of Supply, Demand, and Elasticity 5. Supply, Demand, and Government Policies <ul style="list-style-type: none"> • Controls on Prices • Market Efficiency • Market Efficiency and Market Failure 6. Application: The Costs of Taxation <ul style="list-style-type: none"> • The Deadweight Loss of Taxation • The Determinants of the Deadweight Loss • Deadweight Loss and Tax Revenue as Taxes Vary 7. Consumers, Producers, and the Efficiency of Markets <ul style="list-style-type: none"> • Consumer Surplus • Producer Surplus • Market Efficiency 8. Firms in Competitive markets <ul style="list-style-type: none"> • What Is a Competitive Market? • Profit Maximization and the Competitive Firm's Supply Curve • The Supply Curve in a Competitive Market |
| Study and examination requirements and forms of examination | First exam 20% Second exam 20% Assignments 20% Final exam 40% |
| Media employed | PowerPoint slides, E-learning Moodle, lecture notes, supplementary material of textbook web site and case studies. |
| Reading list | Required textbook: <ol style="list-style-type: none"> 1. Mankiw, 2017, Principles of Economics, 8th Ed., Thomson South Western. 2. Recommended References: 3. Pensen, Capps, Rosson and Woodward, 2009. Introduction to Agricultural Economics, 5Th Ed., Printice Hall. USA. 4. Seitz, Nelson and Halcrow, 2009. Economics of Resources, Agriculture and Food, 2nd Ed Waveland Pr Inc. USA. |

| Module designation | Extension and Transfer of Agricultural Technology | | |
|--|---|---------------|---------------|
| Module level, if applicable | Second Year | | |
| Code, if applicable | PP262 | | |
| Subtitle, if applicable | | | |
| Courses, if applicable | First and Second semesters | | |
| Semester(s) in which the module is taught | First and Second semesters | | |
| Person responsible for the module | Dr. Laith M. Rousan | | |
| Lecturer | Dr. Laith M. Rousan | | |
| Language | English | | |
| Relation to curriculum | Compulsory course in the second semester of the third year | | |
| Type of teaching, contact hours | 3 Credit Hours Lecture: 3 lectures | | |
| Workload | | Contact Hours | Private Study |
| | Lecture | 45 | 71 |
| | Exams | 4 | 30 |
| | Total | 49 | 101 |
| | Total hours = 150 | | |
| Credit points | 5 ECTS | | |
| Requirements according to the examination regulations | None | | |
| Recommended prerequisites | NF 281 Principles of Nutrition Or NF 275 Principles of Food Science | | |

| Module designation | Extension and Transfer of Agricultural Technology |
|--|--|
| Module objectives/intended learning outcomes | <p>Learning outcomes</p> <ol style="list-style-type: none"> 1. Provide an historical, developmental and conceptual context for understanding Agricultural Extension and its role in the developmental process. 2. Students will learn about the main Models of Extension that can be used in Developing Countries in terms of their characteristics and the encounter weaknesses. All approaches and methods of Extension programs will be viewed. 3. This course will describe the different methods, procedures, and techniques for carrying out extension programs. Individual Teaching Methods and group Teaching Methods. 4. This course will focus on the different alternative primary public and private approaches (Models of Extension) used in developing countries in terms of its suitability, strength and weakness 5. The students will be exposed to the process of diffusion and adoption of Agricultural Innovations. In addition, organizational considerations such as administering, and evaluating extension programs are discussed. 6. The students will be exposed to Survey Research Techniques from Planning, Sampling, Construction of the instrument, Carrying out the Survey and Analyzing and Processing the data |
| Content | <ol style="list-style-type: none"> 1. EVOLUTION OF AGRICULTURAL EXTENSION: Principles, Definitions, distinguishing characteristics of Agricultural Extension. The history and development of agricultural Extension. The role of agricultural extension in the development Process. Extension Models (approaches) in Developing Countries. 2. IMPROVING AGRICULTURAL EXTENSION PROGRAMMES: Extension program development Survey Research Instrument development Data collection and analysis Individual and group extension methods 3. DIFFUSION AND ADOPTION OF AGRICULTURAL INOVATIONS. Diffusion and Adoption Process. Extension role in adapting and evaluating new. 4. AGRICULTURAL EXTENSION SYSTEM IN JORDAN Introduction The new strategy of extension system Public extension service and private extension service Problems and weaknesses of extension service |
| Study and examination requirements and forms of examination | <p>First Exam 20% Second Exam 20% Drop Quiz 10% Final Exam 40%</p> |

| Module designation | Extension and Transfer of Agricultural Technology |
|---------------------------|--|
| Media employed | PowerPoint slides, E-learning Moodle, lecture notes, blackboard, Hand-outs. APS learning center |
| Reading list | <ol style="list-style-type: none"> 1. Blackburn, D.J. (1989). Foundations and changing practices in Extension. University of Guelph. Ontario, Canada. 2. Boyle, P.G. (1981). Planning Better Programs. University of Wisconsin – Extension Education Madison. 3. Rogers, E. M. (1995). Diffusion of Innovations (Fourth Edition). The Free Press, New York. |

3- Department Compulsory Courses

| Module designation | Principles of Animal Science | | | | | | | | | | | | | | |
|---|--|---------------|--|--|---------------|---------------|----------|----|----|-------|---|----|-------|----|-----|
| Module level, if applicable | Second year | | | | | | | | | | | | | | |
| Code, if applicable | AP 206 | | | | | | | | | | | | | | |
| Subtitle, if applicable | | | | | | | | | | | | | | | |
| Courses, if applicable | | | | | | | | | | | | | | | |
| Semester(s) in which the module is taught | First and Second semester | | | | | | | | | | | | | | |
| Person responsible for the module | Dr. Abdullah Y. Abdullah | | | | | | | | | | | | | | |
| Lecturer | Dr. Abdullah Y. Abdullah. | | | | | | | | | | | | | | |
| Language | English | | | | | | | | | | | | | | |
| Relation to curriculum | Compulsory course in the first semester of the second year | | | | | | | | | | | | | | |
| Type of teaching, contact hours | 3 Credit Hours Lecture: 3 lectures | | | | | | | | | | | | | | |
| Workload | <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th></th> <th>Contact Hours</th> <th>Private Study</th> </tr> </thead> <tbody> <tr> <td>Lectures</td> <td>45</td> <td>81</td> </tr> <tr> <td>Exams</td> <td>4</td> <td>20</td> </tr> <tr> <td>Total</td> <td>49</td> <td>101</td> </tr> </tbody> </table> <p>Total hours = 150</p> | | | | Contact Hours | Private Study | Lectures | 45 | 81 | Exams | 4 | 20 | Total | 49 | 101 |
| | Contact Hours | Private Study | | | | | | | | | | | | | |
| Lectures | 45 | 81 | | | | | | | | | | | | | |
| Exams | 4 | 20 | | | | | | | | | | | | | |
| Total | 49 | 101 | | | | | | | | | | | | | |
| Credit points | 5 ECTS | | | | | | | | | | | | | | |
| Requirements according to the examination regulations | None | | | | | | | | | | | | | | |
| Recommended prerequisites | HSS103BT | | | | | | | | | | | | | | |
| Module objectives/intended learning outcomes | <p><i>Upon successful completion of this course, students should be able to:</i></p> <ol style="list-style-type: none"> 1. <i>Identify the importance of livestock to our live</i> 2. <i>Identify the main feeds and their function in farm animals</i> 3. <i>know the main features of the reproductive physiology of farm animals</i> 4. <i>know the main features of dairy, beef, Sheep and goat cattle and also the main</i> 5. <i>product of Broiler and laying hens management and production</i> | | | | | | | | | | | | | | |

| Module designation | Principles of Animal Science |
|--|--|
| | <p>6. <i>know the main practices that used for animal care and handling</i></p> <p>7. <i>know the main features of breeding and selection purposes</i></p> <p>8. <i>understand the terminologies used in livestock science</i></p> |
| Content | <ol style="list-style-type: none"> 1. Introduction to the course Terminology 2. Animal Contributions to Human Needs Animal Contributions to 3. Human Needs 4. Red Meat Products 5. Milk and Milk Products 6. Reproduction 7. Nutrients and Their Functions 8. Digestion and Absorption of Feed 9. Lactation 10. Dairy Cattle Breeds and Breeding 11. Beef Cattle Breeds and Breeding 12. Sheep and Breeds and Breeding |
| Study and examination requirements and forms of examination | <p>First Exam 30%</p> <p>Second Exam 30%</p> <p>Final Exam 40%</p> |
| Media employed | PowerPoint slides, E-Learning Moodle, and Lecture Notes |
| Reading list | Scientific Farm Animals. R. E. Taylor and T. G. Field. 8th Edition. |

| Module designation | Introduction to Biostatistics | | |
|--|--|---------------|---------------|
| Module level, if applicable | Second Year | | |
| Code, if applicable | AP 213 | | |
| Subtitle, if applicable | | | |
| Courses, if applicable | | | |
| Semester(s) in which the module is taught | First, and Second semester | | |
| Person responsible for the module | Dr. Mohammad Obeidat | | |
| Lecturer | Dr. Mohammad Obeidat. | | |
| Language | English | | |
| Relation to curriculum | Compulsory course in the second semester of the second year | | |
| Type of teaching, contact hours | 3 Credit Hours Lecture: 3 lectures | | |
| Workload | | Contact Hours | Private Study |
| | Lectures | 45 | 81 |
| | Exams | 4 | 20 |
| | Total | 49 | 101 |
| | Total hours = 150 | | |
| Credit points | 5 ECTS | | |
| Requirements according to the examination regulations | None | | |
| Recommended prerequisites | HSS102MATH pass | | |
| Module objectives/intended learning outcomes | <p>Upon successful completion of this course, students should be able to:</p> <ol style="list-style-type: none"> 1. Perform biostatistical analyses including data analysis techniques, measures of central tendency, measures of variation. 2. Apply methods of biostatistics to analysis of biological data and understand the effects of sample size on results. 3. Understand and apply the normal distribution and chi square distribution to biological data. 4. Use methods of inferential biostatistics including hypothesis testing, confidence interval evaluation | | |
| Content | 1. Introduction To Biostatistics | | |

| Module designation | Introduction to Biostatistics |
|--|--|
| | <ol style="list-style-type: none"> 2. Descriptive Statistics 3. Some Basic Probability Concepts 4. Probability Distributions 5. Some Important Sampling Distributions 6. Estimation 7. Hypothesis Testing 8. Simple Linear Regression And Correlation |
| Study and examination requirements and forms of examination | <ol style="list-style-type: none"> 1. First Exam 30% 2. Second Exam 30% 3. Final Exam 40% |
| Media employed | PowerPoint slides, E-Learning Moodle, and Lecture Notes |
| Reading list | BIostatistics A Foundation for Analysis in the Health Sciences. WAYNE W. DANIEL, CHAD L. CROSS. 10th Edition |

| Module designation | Organic Chemistry | | |
|--|---|---------------|---------------|
| Module level, if applicable | First Year | | |
| Code, if applicable | HSS217CHEM | | |
| Subtitle, if applicable | | | |
| Courses, if applicable | | | |
| Semester(s) in which the module is taught | First, second and summer | | |
| Person responsible for the module | Dr. Mousa Al-Smadi | | |
| Lecturer | Dr. Mousa Al-Smadi, Raed Al-Zoubi, Dr. Ahmad Ajlouni | | |
| Language | English | | |
| Relation to curriculum | Compulsory Course in second Semester of the First year | | |
| Type of teaching, contact hours | 3 Credit Hours Lecture: 3 lectures | | |
| Workload | | Contact Hours | Private Study |
| | Lecture: | 45 | 56 |
| | Book exercises | 0 | 15 |
| | Exams & Quizzes: | 4 | 30 |
| | Total | 49 | 101 |
| | Total hours = 150 | | |
| Credit points | 5 ECTS | | |
| Requirements according to the examination regulations | | | |
| Recommended prerequisites | HSS103CHEM | | |
| Module objectives/intended learning outcomes | <p>Objectives: This course aims to teach students the basic principles of organic chemistry. The first part of the course will cover the fundamental aspects of structural organic chemistry to familiarize the students the main families of organic chemistry functions as well as the 3D structure of organic molecules. The basics of reactivity will also be covered using the mechanisms. The course will be frequently illustrated with examples linked to other scientific disciplines, in particular to the field of life sciences</p> | | |

| Module designation | Organic Chemistry |
|---------------------------|---|
| | <p>Learning outcomes: Having finished the course lectures, students will be able to:</p> <ol style="list-style-type: none"> 1. Understand the structural organic chemistry for main families of organic chemistry. 2. Understand the 3D structure of organic molecules. 3. Manipulate the basic of reactivity and the mechanisms 4. Manipulate the functional groups transformations. |
| Content | <p>Bonding and Isomerism How electrons are arranged in atoms, Ionic and covalent bonds, Valence and hybridization, Isomerism, Writing structural formula, Resonance</p> <p>Alkanes and Cycloalkanes and Geometric isomerism The structure of Alkanes, IUPAC Rules for naming Alkanes, Alkyl and Halogen substituents, Conformation and geometric isomerism, Cycloalkanes and Isomerism, Reactions of Alkanes.</p> <p>Alkenes and Alkynes Definition and classification, Nomenclature, Geometric Isomerism in Alkenes, Addition and substitution reactions, Polar addition reactions (addition of Halogens and water), Addition of unsymmetric reagents to unsymm. Alkenes (Markonikovs' Rule and Hydroboration reaction), Reaction equilibrium and reaction rates, Addition of hydrogen, Addition to conjugated system, Oxidation of Alkenes, Addition reactions to alkynes, Acidity of alkynes</p> <p>Aromatic compounds Some Facts About Benzene, Structure of Benzene. Orbital Model for Benzene & Resonance, Nomenclature of Aromatic compounds, Electrophilic Aromatic substitution reactions, Ring activating and deactivating substituents</p> <p>Stereoisomerism Chirality and Enantiomers, Stereogenic Centers; the Stereogenic Carbon Atom, Configuration and the R-S Convention, The E-Z Convention for cis-trans Isomers, Polarized Light and Optical Activity, Properties of Enantiomers, Diastereomers and Meso compounds, Stereochemistry and chemical reactions, Organic Halogen Compounds, Nucleophilic Substitution, SN2 Mechanism, SN1 Mechanism, Dehydrohalogenation: E1 and E2, Substitution and Elimination in competition</p> <p>Alcohols, Phenols, and Thiols Nomenclature of Alcohols & its Classification, Nomenclature of Phenols, Hydrogen Bonding in Alcohols and Phenols, Acidity and Basicity Reviewed. The Acidity & Basicity of Alcohols and Phenols., Dehydration of Alcohols to Alkenes, The Reaction of Alcohols with Hydrogen Halides, Oxidation of Alcohols to Aldehydes, Ketones, and Carboxylic Acids, Aromatic Substitution in Phenols, Thiols, the Sulfur Analogs of Alcohols and Phenols</p> |

| Module designation | Organic Chemistry |
|--|---|
| | <p>Ethers and Epoxides Nomenclature of ethers and properties, The Grignard Reagent, Preparation and cleavage of ethers, Epoxides</p> <p>Aldehydes and Ketones Nomenclature of Aldehydes and Ketones, Synthesis of Aldehydes and Ketones, Addition of Alcohol, Addition of water, Addition of Grignard Reagent, Addition of hydrogen cyanide, Addition of Nitrogen nucleophile, Reduction of carbonyl compounds, Oxidation of carbonyl compounds</p> <p>Carboxylic Acids and their Derivatives Nomenclature and Physical Properties, Acidity and acidity constant, Effect of structure on Acidity, Preparation of Acids, Carboxylic acid derivatives, Preparation and Reactions of Esters, Preparation and Reactions of Acyl Halides, Preparation and Reactions of Acid Anhydrides, Urea and Amides</p> <p>Amines and Related Nitrogen compounds Classification and structure of Amines, Nomenclature and preparation of Amines, Preparation of Amines, The basicity of Amines, Reaction of Amines with strong acids, Aromatic diazonium compounds, Diazo coupling</p> |
| Study and examination requirements and forms of examination | <p>The final mark of the course consists of:</p> <p>Computer-based exams:</p> <ol style="list-style-type: none"> First exam (30% of the final mark): composed of multiple- choice questions. Second exam (30% of the final mark): composed of multiple- choice questions. Final exam (40% of the final mark): composed of multiple- choice questions. |
| Media employed | <p><u>Lecture:</u> Projector, e-learning, power point presentations and whiteboard</p> <p><u>Exercise:</u> Examples and solved problems of course activities will be announced</p> |
| Reading list | <ol style="list-style-type: none"> Organic Chemistry (12th Edition), Authors: Harold Hart, Leslie Craine, David Hart and C. Hadad. Houghton Mifflin Company, Boston U.S.A. 2007 Organic Chemistry, 8th ed., By Solomons.(2004) Organic Chemistry, J. McMurry (2004) |

| Module designation | Analytical Chemistry | | |
|--|---|----------------------|----------------------|
| Module level, if applicable | Second Year | | |
| Code, if applicable | CHEM233 | | |
| Subtitle, if applicable | Dr. Yahya R. Tahboub | | |
| Courses, if applicable | Dr. Yahya R. Tahboub, Dr. Salem Barakat, Dr. Mahmoud Hamori | | |
| Semester(s) in which the module is taught | First, second and summer | | |
| Person responsible for the module | Dr. Yahya R. Tahboub | | |
| Lecturer | Dr. Yahya R. Tahboub, Dr. Salem Barakat, Dr. Mahmoud Hamori | | |
| Language | English | | |
| Relation to curriculum | Compulsory Course in 2 nd Semester of the second year | | |
| Type of teaching, contact hours | 3 Credit Hours Lecture: 3 lectures | | |
| Workload | | Contact Hours | Private Study |
| | Lecture: | 45 | 56 |
| | Book exercises | 0 | 15 |
| | Exams | 4 | 30 |
| | Total | 49 | 101 |
| | Total hours = 150 | | |
| Credit points | 5 ECTS | | |
| Requirements according to the examination regulations | | | |
| Recommended prerequisites | HSS103CHEM pass | | |
| Module objectives/intended learning outcomes | <p>Objectives: This course aims to teach students the basic principles of analytical chemistry. The first part of the course will cover statistical aspects of analytical chemistry including errors and validation of analytical results. The second part will deal with preparation of reagents and standards, equilibrium considerations and analyte matrix interactions. The third part will cover classical methods of analysis including gravimetric methods and volumetric (titrimetric) methods. The course will be frequently illustrated with case studies and practical examples linked to</p> | | |

| Module designation | Analytical Chemistry |
|---------------------------|---|
| | <p>other scientific disciplines, in particular to the fields of environmental, pharmaceutical and forensic sciences.</p> <p>Learning outcomes: Having finished the course lectures, students will be able to:</p> <ol style="list-style-type: none"> 1. Understand preparation of solutions and expression of analytical results 2. Understand the statistical evaluation of analytical data. 3. Understand equilibrium considerations for analytical reactions including activity and systematic treatment of equilibrium. 4. Understand precipitation equilibrium and its applications on gravimetric and titrimetric methods. 5. Understand aqueous equilibrium and its applications on acid- base titrations including mono and diprotic. 6. Apply classical methods for determination of analytes on real samples including environmental and pharmaceutical. |
| Content | <p>Analytical Process The analytical Chemist job, General steps in a chemical analysis</p> <p>Chemical Measurements SI units, Preparation of solutions, Stoichiometric calculations</p> <p>Experimental Error Significant figures, of errors, Manipulation of uncertainties of results Statistics, Gaussian distribution, Confidence intervals, of analytical result, Rejection of a replicate</p> <p>Chemical Equilibria Equilibrium constant, Precipitation equilibria</p> <p>Activity and Systematic Treatment of Equilibria Ionic strength and activity coefficients, Systematic treatment of equilibria</p> <p>Gravimetric Analysis and Precipitation Titration Gravimetric analysis, Analytical precipitation, Precipitation titrations</p> <p>Monoprotic Acid-Base Equilibria pH (Chapter 6), Strong acids and bases, Weak acids and bases, Weak acid equilibria, Weak base equilibria, Buffers</p> <p>Polyprotic Acid-Base Equilibria Diprotic acids and bases, Diprotic buffers, Polyprotic acids and bases, Fractional composition equations</p> <p>Acid-Base Titrations</p> |

| Module designation | Analytical Chemistry |
|--|--|
| | <p>Titration of strong base with strong acid, Titration of weak base with strong acid, Titration of weak acid with strong base, of diprotic acid with strong base, Titration of dibasic salt with strong acid, Finding end point with indicators, Applications on acid-base titrations (mixtures, Kjeldal nitrogen analysis)</p> <p>Complexation Titrations with EDTA Metal chelate complexes, EDTA, EDTA titration curves, Metal ion indicators, titration techniques</p> <p>Fundamentals of Electrochemistry Basic concepts, cells, Standard potentials, Nernst equation</p> <p>Redox Titrations The shape of redox</p> <p>Amines and Related Nitrogen compounds Classification and structure of Amines, Nomenclature and preparation of Amines, Preparation of Amines, The basicity of Amines, Reaction of Amines with strong acids, Aromatic diazonium compounds, Diazo coupling</p> |
| Study and examination requirements and forms of examination | <p>The final mark of the course consists of:</p> <p>Computer-based exams:</p> <ol style="list-style-type: none"> First exam (25% of the final mark): composed of multiple-choice questions. Second exam (25% of the final mark): composed of multiple-choice questions. Final exam (40% of the final mark): composed of multiple-choice questions. <p>Paper-based assessment:</p> <ol style="list-style-type: none"> Quizzes (10% of the final mark): composed of multiple-choice questions. At least 5 quizzes will be given during the course |
| Media employed | <p><u>Lecture:</u> Projector, e-learning, power point presentations and whiteboard</p> <p><u>Exercise:</u> Examples and solved problems of course activities will be announced</p> |
| Reading list | <p><u>Textbook:</u> Quantitative Chemical Analysis (8th Edition), Authors: Daniel C. Harris W. H. Freeman Company, New York U.S.A. 2010</p> <p><u>References and Supplement Materials:</u></p> <ol style="list-style-type: none"> Fundamentals of Analytical Chemistry 9th edition, Skoog, West, Crouch & Hollar (2014) Analytical Chemistry 7th edition, Christian, Dagupta & Chung (2017) |

| Module designation | Analytical Chemistry Laboratory | | |
|--|---|----------------------|----------------------|
| Module level, if applicable | Second Year | | |
| Code, if applicable | CHEM234 | | |
| Subtitle, if applicable | | | |
| Courses, if applicable | | | |
| Semester(s) in which the module is taught | First, second and summer | | |
| Person responsible for the module | Mr. Ayman Amrat | | |
| Lecturer | Mr. Ayman Amrat | | |
| Language | English | | |
| Relation to curriculum | Compulsory course in the second semester of the second year | | |
| Type of teaching, contact hours | 1 Credit Hours Lab session: 1 Lab | | |
| Workload | | Contact Hours | Private Study |
| | Lab session: | 42 | 10 |
| | Reports | 0 | 13 |
| | Exams & Quizzes: | 3 | 22 |
| | Total | 45 | 45 |
| | Total hours = 90 | | |
| Credit points | 3 ECTS | | |
| Requirements according to the examination regulations | | | |
| Recommended prerequisites | CHEM 107 pass, CHEM 233 study Or concurrent | | |
| Module objectives/intended learning outcomes | <p>Objectives: This course aims to teach students the basic principles of analytical chemistry. The first part of the course will cover the preparation of reagent, statistical evaluation of replicated data measurements and study the validity of results. Analysis of unknowns will also be covered using different analytical qualitative and quantitative methods. The course will be frequently illustrated examples linked to other scientific disciplines, in particular to medicine, pharmaceutical, and agricultural sciences</p> | | |

| Module designation | Analytical Chemistry Laboratory |
|--|--|
| | <p>Learning outcomes: Having finished the course lab sessions, students will be able to:</p> <ol style="list-style-type: none"> 1. Develop the experimental skills including the ability to use balances, glassware, and chemicals required. 2. Learn the basics and applications of classical methods for qualitative and quantitative analysis (gravimetric and titrimetric) 3. Able to apply statistical methods for analyzing experimental data and test the validity of results and make reasonable conclusions about these results. |
| Content | <ol style="list-style-type: none"> 1. Preparation of Analytical Reagents and Calibration standards 2. Statistical evaluation of analytical results 3. Gravimetric determination of sulfate 4. Application of acid-base titration 1: Assay of strong acids, acidity of vinegar and alkalinity of water 5. Application of acid-base titration 2: Assay of sodium carbonate in soda ash and determination of total alkalinity of water 6. Back titration 7. Potentiometric titration of mixtures of carbonates, bicarbonates and hydroxides 8. Determination of chloride by precipitation titration 9. Determination of calcium, magnesium and total hardness of water by complexation titration 10. Oxidation reduction Titrations 11. Iodimetric titration of ascorbic acid in vitamin tablets |
| Study and examination requirements and forms of examination | <p><i>The final mark of the course consists of:</i></p> <p>Computer-based exams:</p> <ol style="list-style-type: none"> a. Midterm exam (40% of the final mark): composed of multiple-choice questions. b. Final exam (40% of the final mark): composed of multiple-choice questions. <p>Lab reports:</p> <ol style="list-style-type: none"> a. Reports (20% of the final mark): Description, results and conclusions about lab experiments |
| Media employed | <p><u>Lab session:</u> demonstration, e-learning and whiteboard</p> <p><u>Exercise:</u> Examples and solved problems of course activities will be announced</p> |
| Reading list | <ol style="list-style-type: none"> 1. Quantitative Chemical Analysis (8th Edition), Authors: Daniel C. Harris W. H. Freeman Company, New York U.S.A. 2010 2. Fundamentals of Analytical Chemistry 9th edition, Skoog, West, Crouch & Holler (2014) 3. Analytical Chemistry 7th edition, Christian, Dagupta & Chung (2017) |

| Module designation | Biochemistry | | |
|--|--|---------------|---------------|
| Module level, if applicable | Second Year | | |
| Code, if applicable | CHEM262 | | |
| Subtitle, if applicable | | | |
| Courses, if applicable | | | |
| Semester(s) in which the module is taught | First, second and summer | | |
| Person responsible for the module | Dr. Barakat Shabsoug | | |
| Lecturer | Dr. Barakat Shabsoug, Dr Ayat Bani Irshaid, Dr. Amjad mahasneh | | |
| Language | English | | |
| Relation to curriculum | Compulsory Course in first Semester of the second year | | |
| Type of teaching, contact hours | 3 Credit Hours Lecture: 3 lectures | | |
| Workload | | Contact Hours | Private Study |
| | Lecture: | 45 | 61 |
| | Exams: | 4 | 40 |
| | Total | 49 | 101 |
| | Total hours = 150 | | |
| Credit points | 5 ECTS | | |
| Requirements according to the examination regulations | | | |
| Recommended prerequisites | HSS217CHEM pass, HSS103BT pass | | |
| Module objectives/intended learning outcomes | <p>Objectives: This course deals with structure and properties of biomolecules, such as amino acids, proteins, carbohydrates, lipids, and nucleic acids. The focus of this course will be on the relationship between protein structure and its biological function, generation and storage of metabolic energy, main metabolic pathways and their key steps. In addition, the role of phospholipids in determining the properties of biological membranes and their function will be discussed.</p> <p>Learning outcomes: Having finished the course lectures, students will be able to:</p> | | |

| Module designation | Biochemistry |
|---------------------------|---|
| | <ol style="list-style-type: none"> 1. Know the language of biochemistry. 2. Understand the structure and function of biomolecules. 3. Acquire knowledge and understanding of the concepts in this course. 4. Develop critical thinking skills. 5. Project a clear and repeated emphasis on major themes especially those relating to evolution, thermodynamics and regulation. 6. Sustain the student's interest by developing topics in a logical and stepwise manner |
| Content | <p>Aqueous Chemistry Water Molecules Form Hydrogen Bonds, The Hydrophobic Effect, Acid-Base Chemistry, Tools and Techniques: Buffers</p> <p>Protein Structure Proteins Are Chains of Amino Acids, Structure: The Conformation of the Peptide Group, Tertiary Structure and Protein Stability, Quaternary Structure</p> <p>Protein Structure Myoglobin and Hemoglobin: Oxygen-Binding Proteins, Structural Proteins, Actin, Tubulin, Keratin, Collagen is a triple helix</p> <p>How Enzymes Work? What is an enzyme?, The Chemistry of Catalysis, The Unique Properties of Enzyme Catalysts, Some Additional Features of Enzymes</p> <p>Enzyme Kinetics and Inhibition Introduction to Enzyme Kinetics, Derivation and Meaning of the Michaels-Menten Equation, Enzyme Inhibition</p> <p>Lipids Membranes Lipids, The Lipid Bilayer, Membrane Proteins, The Fluid Mosaic Model</p> <p>Membrane Transport The Thermodynamics of Membrane Transport, Passive Transport, Active Transport</p> <p>Carbohydrates Monosaccharides, Polysaccharides, Glycoproteins</p> <p>Metabolism and Bioenergetics Food and Fuel, Metabolic Pathways, Free Energy Changes and Metabolic Reactions</p> <p>Glucose Metabolism</p> |

| Module designation | Biochemistry |
|--|---|
| | <p>Storage Mechanisms and Control in Carbohydrate Metabolism, How glycogen is produced and degraded, Gluconeogenesis produces glucose from pyruvate, Control of carbohydrate metabolism, Glucose is sometimes diverted through the pentose phosphate pathway</p> <p>The Citric Acid Cycle The central role of the citric acid cycle in metabolism, overall pathway of the citric acid cycle, is pyruvate converted to acetyl-CoA, The individual reactions of the citric acid cycle, Energetic and control of the citric acid cycle, The glyoxylate cycle, link to oxygen</p> <p>Electron Transport and Oxidative Phosphorylation The role of electron transport in metabolism, The reduction potentials in the electron transport chain, of electron transport complexes, connection between electron transport and phosphorylation, mechanism of coupling in oxidative phosphorylation, Respiratory inhibitors used to study electron transport, The ATP yield from complete oxidation of glucose</p> <p>Lipid Metabolism Lipids are involved in the generation and storage of energy, of lipids, energy yield from the oxidation of fatty acids, Catabolism of unsaturated fatty acids and odd-carbon fatty acids, Ketone bodies, Fatty-acid biosynthesis, Cholesterol biosynthesis (In brief)</p> <p>The Metabolism of Nitrogen Nitrogen metabolism: an overview, fixation, Amino acid biosynthesis, amino acids, Amino acid catabolism, Purine and pyrimidine catabolism</p> |
| Study and examination requirements and forms of examination | <p><i>The final mark of the course consists of:</i></p> <p>Computer-based exams:</p> <ol style="list-style-type: none"> a <i>First exam (30% of the final mark): composed of multiple-choice questions.</i> b <i>Second exam (30% of the final mark): composed of multiple-choice questions.</i> c <i>Final exam (40% of the final mark): composed of multiple-choice questions.</i> |
| Media employed | <p><u>Lecture:</u> Projector, e-learning, power point presentations and whiteboard</p> <p><u>Exercise:</u> Examples and solved problems of course activities will be announced</p> |
| Reading list | <p><u>Textbook:</u> ESSENTIAL BIOCHEMISTRY, C.W. Pratt and K. Cornely (20014), Third Edition. Publisher: John Wiley and Sons, Inc., USA</p> |

| Module designation | Biochemistry |
|---------------------------|---|
| | <u>References and Supplement Materials:</u> <ol style="list-style-type: none"><li data-bbox="407 310 1386 380">1. BIOCHEMISTRY, M.K. Campbell and S. O. Farrell (2012), 7th Edition. Publisher: Thomson Learning, Inc., USA.<li data-bbox="407 380 1386 415">2. Principles of Biochemistry, 4rd ed., by Lehninger, Nelson, & Cox (2004). |

| Module designation | Biochemistry Laboratory | | |
|--|--|---------------|---------------|
| Module level, if applicable | Second Year | | |
| Code, if applicable | CHEM266 | | |
| Subtitle, if applicable | | | |
| Courses, if applicable | | | |
| Semester(s) in which the module is taught | First, second and summer | | |
| Person responsible for the module | Mr. Adeeb Al-Faqeeh | | |
| Lecturer | Mr. Adeeb Al-Faqeeh and others | | |
| Language | English | | |
| Relation to curriculum | Compulsory course in the first semester of the second year | | |
| Type of teaching, contact hours | 1 Credit Hours Lab session: 1 Lab | | |
| Workload | | Contact Hours | Private Study |
| | Lab session: | 42 | 10 |
| | Reports | 0 | 15 |
| | Exams & Quizzes: | 3 | 20 |
| | Total | 45 | 45 |
| | Total hours = 90 | | |
| Credit points | 3 ECTS | | |
| Requirements according to the examination regulations | | | |
| Recommended prerequisites | CHEM 262 study Or concurrent | | |
| Module objectives/intended learning outcomes | <p>Objectives: This course aims to teach students the principles of safety and hazards in biochemistry laboratories. The first five experiments of the course will cover the fundamental techniques and the advanced instruments used in the analysis and constructing important curves of amino acids and some other dyes. In the second five experiments the students will learn how to identify quantize and differentiate between different biochemical compounds.</p> <p>Learning outcomes:</p> | | |

| Module designation | Biochemistry Laboratory |
|--|--|
| | Having finished the course <u>lab sessions</u> , students will be able to: <ol style="list-style-type: none"> 1. Understand experiments and enhance their ability in thinking and research. 2. Manipulate all experimental data and curves construction. 3. Learn how to collect a human blood sample centrifuge and analyze the serum for Glucose, Albumin, and Cholesterol. 4. Learn how to test for Carbohydrate and their classification. |
| Content | <ol style="list-style-type: none"> 1. Titration curves of Amino Acids. 2. Absorbance curves of two colored compounds. 3. General properties of Amino Acids. 4. Separation of Amino acids by Paper chromatography and electrophoresis. 5. General properties of Proteins. 6. Quantitation of proteins. 7. Preparation of an enzyme extract Polyphenoloxidase (PPO). 8. General properties of Lipids. 9. Enzymatic colorimetric method (End Point). 10. General properties of Carbohydrates. |
| Study and examination requirements and forms of examination | The final mark of the course consists of: Computer-based exams: <ol style="list-style-type: none"> a. Midterm exam (40% of the final mark): composed of multiple-choice questions. b. Final exam (40% of the final mark): composed of multiple-choice questions. Lab reports: <ol style="list-style-type: none"> a. Reports (20% of the final mark): Description, results and conclusions about lab experiments |
| Media employed | <u>Lab session:</u> demonstration, e-learning and whiteboard <u>Exercise:</u> Examples and solved problems of course activities will be announced |
| Reading list | <ol style="list-style-type: none"> 1. Essential Biochemistry, C.W. Pratt and K. Cornely (20014), Third Edition. Publisher: John Wiley and Sons, Inc., USA 2. Biochemistry, M.K. Campbell and S. O. Farrell (2012), 7th Edition. Publisher: Thomson Learning, Inc., USA. 3. Principles of Biochemistry, 4rd ed., by Lehninger, Nelson, & Cox (2004). |

| Module designation | General Microbiology | | |
|--|---|----------------------|----------------------|
| Module level, if applicable | Third Year | | |
| Code, if applicable | BT 231 | | |
| Subtitle, if applicable | | | |
| Courses, if applicable | | | |
| Semester(s) in which the module is taught | First, second and summer | | |
| Person responsible for the module | Dr. Abdulkarim Al Sallal | | |
| Lecturer | Dr. Abdulkarim Al Sallal and Dr Ziad Jaradat | | |
| Language | English | | |
| Relation to curriculum | Compulsory Course in first Semester of the third year | | |
| Type of teaching, contact hours | 3 Credit Hours Lecture: 3 lectures | | |
| Workload | | Contact Hours | Private Study |
| | Lecture: | 45 | 81 |
| | Exams | 4 | 20 |
| | Total | 49 | 101 |
| | Total hours = 150 | | |
| Credit points | 5 ECTS | | |
| Requirements according to the examination regulations | | | |
| Recommended prerequisites | HSS103BT pass | | |
| Module objectives/intended learning outcomes | <p>Objectives: Introduction to the microbial world. Diversity of prokaryotes, their development, structure and function. Prokaryotic metabolism, nutrition, growth and control. Major classes of bacteria as well as Viruses and fungi are thoroughly discussed. Host-pathogen relationship and antimicrobial chemotherapy are also be addressed.</p> <p>Learning outcomes: Having finished the course and successfully passed the exams the students should be able;</p> | | |

| Module designation | General Microbiology |
|---------------------------|---|
| | <ol style="list-style-type: none"> 1. Describe the surface structure as well as the internal structure of bacterial cells and their functions 2. Describe the nutritional and physical requirements for bacterial growth and the effect of environment on bacteria and explain the dynamics of the growth of a bacterial population and how this growth can be measured 3. Describe the principals involved in killing bacteria, and be able to decide on the use of physical and chemical methods including antimicrobial chemotherapeutic agents used to control microbial growth in industrial and medical settings 4. Express the fundamental concepts associated with viruses including a detailed understanding of viral classification and replication 5. Comprehend the modern scheme of bacterial classification using molecular microbiology methods and be familiar with major groups of bacteria and fungi and their importance in medical, environmental and food industry 6. Understand ways in which bacterial pathogens can be transmitted to humans, and the factors that influence transmission of pathogens and the occurrence of infectious diseases. This includes the concepts of virulence and virulence factors, opportunistic pathogens, and predisposing factors to disease. |
| Content | <p><u>Lecture</u></p> <ol style="list-style-type: none"> 1. Bacterial cell structure; the chapter explains the structure of all bacterial organelles and their function. 2. Microbial growth; the chapter deals with all aspects of the microbial growth and the growth curve. The closed and open systems of the growth are discussed. All types of microbial media are explained in details. 3. Control of Microorganisms in the Environment; the chapter deals with physical, chemical, mechanical and biological methods of controlling the microbes in the environment. 4. Antimicrobial chemotherapy; the chapter deals with controlling microbes in the human body and tissues using different types and groups of natural and synthetic antibiotics 5. Viruses and other acellular infectious agents; this chapter deals with the classification of the different types of viruses including human, animal and bacterial viruses. The chapter also deals with the acellular infectious agents such as the virusoides and prions. 6. Microbial Taxonomy; the chapter explains the process of microbial taxonomy and its three components; the classification, nomenclature and identification. The taxonomic ranks are discussed as well as the phonetic and genetic methods of classification are addressed. 7. Bacteria- the Poteobacteria: the chapter discusses different types of bacteria based on the new classification schemes. It discusses the 5 types of the proteobacteria, alpha, beta, gamma, delta and epsilon. The focus in this chapter is given for bacteria that is important, industrially, or environmentally, or from health point of view with special consideration for enteric pathogens. |

| Module designation | General Microbiology |
|--|--|
| | <p>8. Bacterial, low GC gram positives; the chapter deals with gram positive bacteria that is important industrially as well as from a pathogenic point of view. Examples of pathogenic bacteria are discussed.</p> <p>9. Bacteria the High GC gram positives; the chapter deals with major Gram-positive Bacteria that high in GC with a special focus on Actinomycetes and its beneficial role in decomposition, antibiotic production as well as some pathogenic aspects.</p> <p>10. The Fungi (Eumycota); the chapter deals with the different groups of fungi that are important as pathogens, decomposers or even the edible ones. The life cycles of all fungi groups is discussed.</p> <p>11. Pathogenicity and Infection; the chapter deals with the pathogenesis of the different microbes and the process of the microbial transmission and infection. The definition and calculations of the infectious doses as well as the lethal doses of the microbes are explained.</p> |
| Study and examination requirements and forms of examination | <p>The final mark of the course consists of:</p> <ul style="list-style-type: none"> • Computer-based exams: <ol style="list-style-type: none"> a. First Midterm exam (30% of the total mark): composed of multiple-choice questions (MCQ) pertaining to the content of the lectures given in the first part of the course. b. Second midterm exams; (30%) of the total mark, composed of multiple-choice questions (MCQ) pertaining to the content of the lectures given in the second part of course. c. Final exam (40% of the total mark): composed of MCQ questions covering the whole course content. |
| Media employed | <u>Lecture:</u> Projector, e-learning, power point presentations and white board |
| Reading list | Prescott, L., Harely , J. P. and Klein. Tenth edition, 2017 |

| Module designation | General Microbiology Laboratory | | |
|--|--|---------------|---------------|
| Module level, if applicable | Third Year | | |
| Code, if applicable | BT 232 | | |
| Subtitle, if applicable | | | |
| Courses, if applicable | | | |
| Semester(s) in which the module is taught | First, second and summer | | |
| Person responsible for the module | Mr. Bayen Mahawreh | | |
| Lecturer | Mr. Bayen Mahawreh and others | | |
| Language | English | | |
| Relation to curriculum | Compulsory course in the first semester of the third year | | |
| Type of teaching, contact hours | 1 Credit Hours Lab session: 1 Lab | | |
| Workload | | Contact Hours | Private Study |
| | Lab session: | 42 | 10 |
| | Reports | 0 | 12 |
| | Exams & Quizzes: | 3 | 23 |
| | Total | 45 | 45 |
| | Total hours = 90 | | |
| Credit points | 3 ECTS | | |
| Requirements according to the examination regulations | | | |
| Recommended prerequisites | | | |
| Module objectives/intended learning outcomes | <p>Objectives: This course focuses on developing laboratory skills in microbiology. It includes isolation, purification, cultivation, smear preparation, staining of the bacteria, performing tests to classify and identify the major groups of bacteria, and studying microbial growth control methods. Upon completion of this lab course, students will acquire basic microbiology techniques and principles. The students will get first-hand experience that will coincide with what is taught in the lecture portion of the class.</p> | | |

| Module designation | General Microbiology Laboratory |
|--|---|
| | <p>Learning outcomes: Having finished the course and successfully passed the exams the students should be able;</p> <ol style="list-style-type: none"> 1. Demonstrate the ability to work with standard lab safety protocols and procedures and how to handle biologically hazardous material, needles and sharps 2. Correctly perform microbiologic lab skills and display a habit of good lab practices, which extends to relevant situations in the student's homes. 3. Demonstrate appropriate laboratory skills and techniques related to the staining of bacteria and estimating the number of microorganisms in a sample 4. Demonstrate appropriate laboratory skills to isolate bacteria and testing antimicrobial activity of agents 5. Explain principles of physical and chemical methods used in the control of microorganisms to prevent and control infectious diseases 6. Demonstrate appropriate laboratory skills related to the identification of bacteria using biochemical testing and metabolism 7. Learn how to make careful observations, collect and analyze data, and draw appropriate conclusions |
| Content | <ol style="list-style-type: none"> 1. Regulation and management of microbiology lab. 2. The microscope and Microscopic examination of living bacterial Preparation 3. Bacterial staining 4. Bacterial staining: Gram staining 5. Bacterial staining: Acid fast staining 6. Culture transfer techniques 7. Techniques for isolation of pure cultures 8. Physical factors 9. Cultivation of Microorganisms 10. Biochemical activities of Microorganisms 11. Cultivation and Enumeration of Bacteriophages |
| Study and examination requirements and forms of examination | <p>The final mark of the course consists of:</p> <ol style="list-style-type: none"> 1. Computer-based exams: <ol style="list-style-type: none"> a. Midterm exam (40% of the final mark): composed of multiple-choice questions on the content of the lectures and practical works. b. Final exam (40% of the final mark): composed of multiple-choice questions on the content of the lectures and practical work. 2. Quizzes (10% of the final mark): 6 quizzes composed of multiple-choice, true/false or fill in the blank questions. 3. Reports (10% of the final mark): 12 reports with certain requirements related to each experiment filled with the results of the practical work. |
| Media employed | Lecture: Power point presentations and whiteboard. |

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|---------------------------|--|
| Module designation | General Microbiology Laboratory |
| | Practical work: Demonstration by the lecturer. |
| Reading list | Microbiology: A laboratory Manual. James Cappuccino and Natalia Sherman. 10th Edition |

| Module designation | Principles of Food Science | | |
|--|--|----------------------|----------------------|
| Module level, if applicable | Second Year | | |
| Code, if applicable | NF 275 | | |
| Subtitle, if applicable | | | |
| Courses, if applicable | | | |
| Semester(s) in which the module is taught | First and second semesters | | |
| Person responsible for the module | Prof. Taha Rababah | | |
| Lecturer | Prof. Taha Rababah | | |
| Language | English | | |
| Relation to curriculum | Compulsory course in the second semester of the first year | | |
| Type of teaching, contact hours | 3 Credit Hours Lecture: 3 lectures | | |
| Workload | | Contact Hours | Private Study |
| | Lectures | 45 | 81 |
| | Exams | 4 | 20 |
| | Total | 49 | 101 |
| | Total hours = 150 | | |
| Credit points | 5 ECTS | | |
| Requirements according to the examination regulations | None | | |
| Recommended prerequisites | HSS103BT HSS103CHEM | | |
| Module objectives/intended learning outcomes | Objectives: <ol style="list-style-type: none"> 1. This course is designed to provide students with a general application and understanding of current issues associated with food products and food ingredients. 2. Discussions will focus on controversial subjects involving food products, food additives, food safety and preservation techniques based on scientific principles and popular belief. Lecture /discussions/demonstrations, | | |

| Module designation | Principles of Food Science |
|--|--|
| | <p>3. This course is designed to introduce students to the basics of food science and provide a branch point for discussions on common misconceptions about the food industry.</p> <p>4. Upon successful completion of the course students are expected to be able to understand basic food science concepts and communicate with others in the field.</p> <p>Learning outcomes:</p> <ol style="list-style-type: none"> 1. To develop an understanding of food production from the farm gate to the consumer plate for students with little or no previous exposure to food science and nutrition issues. 2. To appreciate the technologies, challenges and issues involved in modern day food production, processing, distribution and marketing for both the food industry and consumers. 3. To develop a scientific understanding of the complex current issues in the “world of food”. 4. To gain an appreciation of the interface between food science and nutrition |
| Content | <ol style="list-style-type: none"> 1. Introduction to Food Science 2. Overview of the Food Industry 3. Components of Foods 4. Foods & Nutrition 5. Food Processing Operations 6. Food Quality Factors 7. Food Deterioration & Control 8. Heat Preservation 9. Cold Preservation 10. Dehydration 11. Irradiation 12. Fermentation 13. Milk & Milk Products 14. Meat, Poultry, & Eggs 15. Seafoods 16. Fats & Oils 17. Cereal Grains & Products 18. Fruits & Vegetables 19. Beverages |
| Study and examination requirements and forms of examination | <ol style="list-style-type: none"> a. First Exam: 30% b. Second Exam: 30% c. Theoretical Final Exam: 40% |
| Media employed | PowerPoint slides, E-learning Moodle, lecture notes, blackboard, and others |

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|---------------------------|---|
| Module designation | Principles of Food Science |
| Reading list | Introduction to Food Science by R. Parker (5th Edition), Delmar 2003. |

| Module designation | Principles of Nutrition | | |
|--|---|---------------|---------------|
| Module level, if applicable | Second Year | | |
| Code, if applicable | NF 281 | | |
| Subtitle, if applicable | | | |
| Courses, if applicable | | | |
| Semester(s) in which the module is taught | First, and Second semester | | |
| Person responsible for the module | Dr. Hana Alkhalidy | | |
| Lecturer | Dr. Hana Alkhalidy | | |
| Language | English | | |
| Relation to curriculum | Compulsory course in the second semester of the first year | | |
| Type of teaching, contact hours | 3 Credit Hours Lecture: 3 lectures | | |
| Workload | | Contact Hours | Private Study |
| | Lectures | 35 | 61 |
| | Exercises | 10 | 20 |
| | Exams | 4 | 20 |
| | Total | 49 | 101 |
| | Total hours = 150 | | |
| Credit points | 5 ECTS | | |
| Requirements according to the examination regulations | | | |
| Recommended prerequisites | HSS103BT HSS103CHEM | | |
| Module objectives/intended learning outcomes | Objectives: 1. Understand fundamentals of nutrition and the importance of multi-disciplines, which makes up the basis of this science. 2. Recognize the anatomy and physiology of the organs involved in the processes of digestion, absorption, and utilization of nutrients. 3. Identify nutrients and their dietary resources, functions, recommendations, and how they are metabolized in the human body. 4. Identify some of the nutrition-related diseases and the influence of proper nutrition in obtaining optimal health and in disease prevention during different critical periods. | | |

| Module designation | Principles of Nutrition |
|--|---|
| | <p>5. Practice teamwork and build communication skills to use basic approaches for the presentation of the nutritional information using credible sources of reference materials and databases used by nutrition professionals.</p> <p>Learning outcomes:</p> <ol style="list-style-type: none"> 1. Be familiar with the definition of nutrition science and the factors that make nutrition essential for the health and well-being throughout life. 2. Recognize the digestive system and other accessory organs involved in the digestion, absorption, and utilization of food. 3. Distinguish between the different nutrients, their structures, functions, dietary resources, nutritional requirements and health impact. 4. To credibly assess and practice presenting nutrition-related information as groups. |
| Content | <ol style="list-style-type: none"> 1. An overview of nutrition 2. Digestion, absorption, and transport 3. The Carbohydrates: Sugars, starches, and fibers 4. The lipids: triglycerides, phospholipids 5. Protein: Amino acids 6. Water-soluble vitamins 7. Fat soluble vitamins 8. Water and major minerals 9. Trace minerals 10. Planning a healthy diet |
| Study and examination requirements and forms of examination | <ol style="list-style-type: none"> a. 25% First Exam b. 25% Second Exam c. 10 % Project d. 40% Final Exam |
| Media employed | PowerPoint slides, E-learning Moodle, lecture notes, and Teams meetings. |
| Reading list | Whitney, E. N., and Rolfes S.R (2016). Understanding Nutrition. 14th edition. Cengage learning. |

| Module designation | Meal planning | | |
|--|---|----------------------|----------------------|
| Module level, if applicable | Second Year | | |
| Code, if applicable | NF 282 | | |
| Subtitle, if applicable | | | |
| Courses, if applicable | | | |
| Semester(s) in which the module is taught | First, second and summer | | |
| Person responsible for the module | Dr. Sofyan Maghaydah | | |
| Lecturer | Dr. Sofyan Maghaydah Dr. Bayan Obeidat | | |
| Language | English | | |
| Relation to curriculum | Compulsory course in the first semester of the Second year | | |
| Type of teaching, contact hours | 3 Credit Hours Lecture: 2 Credit Hours Practical: 1 Credit Hour | | |
| Workload | | Contact Hours | Private Study |
| | Lectures | 30 | 60 |
| | Laboratory session | 42 | 22 |
| | Exams | 4 | 22 |
| | Total | 76 | 104 |
| | Total hours = 180 | | |
| Credit points | 6 ECTS | | |
| Requirements according to the examination regulations | None | | |
| Recommended prerequisites | NF281 Principles of Nutrition | | |
| Module objectives/intended learning outcomes | Objectives: 1. Identify and select evidence-based tools and methods for assessing, planning, and evaluating diets for individuals without special dietary needs. 2. Demonstrate the ability to apply knowledge of the role of environment, food, and lifestyle choices to develop interventions to affect change and enhance wellness in diverse individuals and groups. 3. Utilize computer programs to analyze nutrient content of diets | | |

| Module designation | Meal planning |
|--|---|
| | <p>4. Describe weight management issue including components of nutrition, exercise, and behavior modification.</p> <p>5. List and specifically describe dietary guidance (Us dietary Guideline, AHA guideline, cancer reduction guidance, my plate guideline, food composition lists, food labels) available to consumer.</p> <p>Learning outcomes: Able to access, interpret, and translate the most current and credible food and nutrition science into practical guidance to promote health and reduce the risk of disease applied in the context of culture and daily living</p> |
| Content | <ol style="list-style-type: none"> 1. Nutrition labeling 2. Human energy 3. Exchange list 4. My plate and pyramid 5. Tools for diet evaluation 6. Dash diet 7. Vegetarian diet 8. Meal planning for pregnant women 9. Meal planning for adolescent 10. Meal planning for toddlers 11. Meal planning for school children 12. Meal planning for older adults 13. Meal planning for infants |
| Study and examination requirements and forms of examination | <ol style="list-style-type: none"> a. 25% First Exam b. 25% Second Exam c. 10 % Activities and quizzes d. 40% Final Exam |
| Media employed | PowerPoint slides, E-learning Moodle, lecture notes, and Teams or Zoom meetings. |
| Reading list | <p>Complete food and nutrition guide</p> <p>Choose your foods: exchange lists for weight management. Roberta Duyff 2016/2014 4th</p> <p>Academy of nutrition and dietetics, American diabetes Association and the academy of nutrition and dietetic.</p> |

| Module designation | Human Nutrition | | |
|--|---|---------------|---------------|
| Module level, if applicable | Second Year | | |
| Code, if applicable | NF 284 | | |
| Subtitle, if applicable | | | |
| Courses, if applicable | | | |
| Semester(s) in which the module is taught | First, and Second Semester | | |
| Person responsible for the module | Dr. Sana Janakat | | |
| Lecturer | Dr. Sana Janakat | | |
| Language | English | | |
| Relation to curriculum | Compulsory course in the second semester of the second year | | |
| Type of teaching, contact hours | 3 Credit Hours Lecture: 3 lectures | | |
| Workload | | Contact Hours | Private Study |
| | Lectures | 35 | 61 |
| | Exercises | 10 | 20 |
| | Exams | 4 | 20 |
| | Total | 49 | 101 |
| | Total hours = 150 | | |
| Credit points | 5 ECTS | | |
| Requirements according to the examination regulations | None | | |
| Recommended prerequisites | CHEM 262 pass NF 281 pass, HSS103BT pass | | |
| Module objectives/intended learning outcomes | <ol style="list-style-type: none"> 1. To provide detailed information on the function, digestion, transport, storage, and metabolism of the nutrients. 2. To delineate key metabolic pathways in the utilization of macronutrients as well as the interrelationships among nutrients in metabolism. 3. Identify micronutrients that function in energy metabolism, biosynthetic reactions, structural components, regulatory processes, free radical/antioxidant protection, and disease prevention. | | |

| | |
|--|---|
| | 4. Identify changes in metabolism and nutrient needs during exercise To interpret the basis of human nutrient deficiencies and excesses. |
| Content | <ol style="list-style-type: none"> 1. Components of a typical cell Cellular proteins 2. Apoptosis Cytoskeleton 3. Structure of the digestive tract Digestive and absorptive processes Coordination and regulation of digestive process 4. Overview of structural features of carbohydrates Simple carbohydrates Complex carbohydrates Digestion 5. Absorption, transport and distribution of carbohydrates Glycemic response to carbohydrates 6. Definition, Chemistry and characteristics of dietary and functional fibers Selected properties, physiological and metabolic effects of fibers Role of fibers in disease prevention 7. Structure and biological importance of lipids Digestion, absorption and transport of lipids 8. Lipids, lipoproteins and cardiovascular disease Integrated metabolism in tissues Brown fat thermogenesis 9. Amino acids classification according to R groups Amino acids classification according to their fate Amino acids essentiality Digestion and absorption of proteins 10. History of vitamins Vitamin C, B1,B2,Niacine, and Pantothenic acid 11. Biotin, Folate, B12 and B6 12. Vitamin A and carotenoids Vitamin D Vitamin E Vitamin K 13. Vitamin A and carotenoids Vitamin D Vitamin E Vitamin K 14. Calcium, phosphorus and magnesium 15. Iron, zinc, copper, chromium, iodine, manganese and molybdenum |
| Study and examination requirements and forms of examination | <ol style="list-style-type: none"> a. 25% First Hour Exam b. 25% Second Hours Exam c. 10% Quizzes and Assignments d. 40% Final Exam |
| Media employed | PowerPoint slides, E-learning Moodle, and Zoom meetings. |
| Reading list | Gropper, S. and Smith, J. (2013) Advanced Nutrition and Human Metabolism Edition 6th Edition. Wadsworth Cengage Learning, Australia. |

| Module designation | Human Physiology | | |
|--|---|---------------|---------------|
| Module level, if applicable | Second Year | | |
| Code, if applicable | NF 288 | | |
| Subtitle, if applicable | | | |
| Courses, if applicable | | | |
| Semester(s) in which the module is taught | First, and Second and summer | | |
| Person responsible for the module | Dr. Hana Alkhalidy | | |
| Lecturer | - | | |
| Language | English | | |
| Relation to curriculum | Compulsory course in the second semester of the second year | | |
| Type of teaching, contact hours | 3 Credit Hours Lecture: 3 lectures | | |
| Workload | | Contact Hours | Private Study |
| | Lectures | 45 | 81 |
| | Exams | 4 | 20 |
| | Total | 49 | 101 |
| | Total hours = 150 | | |
| Credit points | 5 ECTS | | |
| Requirements according to the examination regulations | None | | |
| Recommended prerequisites | AP206 | | |
| Module objectives/intended learning outcomes | Objectives: <ol style="list-style-type: none"> 1. Know various physiological organ-systems and their importance to the integrative functions of the human body (as a model of study in this course). 2. Define descriptive anatomical and various directional terms, body planes and sections, body regions and cavities in animals and humans. 3. Know body fluid compartments and the ionic composition of body fluids, movement of water and solutes between the fluid compartments and estimation of body fluids based on body weight. | | |

| Module designation | Human Physiology | | | | | | |
|--|--|---------------|-----|----------------|-----|---------------|-----|
| | <ol style="list-style-type: none"> 4. Describe the structure, function and the permeability of the cell membrane; distinguish the transport processes (passive and active) and tonicity of ICF, ECF, and the principle of osmotic pressure and calculation of steady state. 5. Know the components, functions, location and structural features of the kidneys and understand the series nature of the vascular network. 6. Describe the structure, function and physiology of skeletal muscle, including excitation-contraction coupling and neuromuscular junction, sliding filament mechanism, force generation, skeletal muscle mechanics and isometric versus isotonic contractions. 7. Describe structural and functional organization of the nervous system divisions. 8. Distinguish the elements of blood and describe the composition of plasma and anatomy and function of the heart and blood vessels. 9. Identify and describe the major anatomical components and function of the endocrine and reproductive systems. 10. Identify parts of the GIT and their functions. 11. Know the structure and functions of the respiratory system. | | | | | | |
| Content | <ol style="list-style-type: none"> 1. Course Introduction, Terminology and Descriptive Terms used in the study of Anatomy and Physiology. 2. Cell Biology and Membrane Transport 3. Body Fluid and Electrolyte Balance 4. Renal Physiology and Regulation of Body Fluids 5. Skeletal Muscle Physiology 6. The nervous system 7. Blood 8. The Cardiovascular System Physiology 9. The Endocrine Physiology 10. The Respiratory System 11. The Digestive System 12. The Male and Female Reproductive Physiology | | | | | | |
| Study and examination requirements and forms of examination | <table border="0"> <tr> <td>a. First Exam</td> <td>30%</td> </tr> <tr> <td>b. Second Exam</td> <td>30%</td> </tr> <tr> <td>c. Final Exam</td> <td>40%</td> </tr> </table> | a. First Exam | 30% | b. Second Exam | 30% | c. Final Exam | 40% |
| a. First Exam | 30% | | | | | | |
| b. Second Exam | 30% | | | | | | |
| c. Final Exam | 40% | | | | | | |
| Media employed | PowerPoint slides, E-learning Moodle, lecture notes, and Teams meetings. | | | | | | |
| Reading list | Dee Unglaub Silverthorn. (2018) Human Physiology: An Integrated Approach (7th Edition). Pearson. | | | | | | |

| Module designation | Scientific Writing | | |
|--|---|----------------------|----------------------|
| Module level, if applicable | Second Year | | |
| Code, if applicable | NF299 | | |
| Subtitle, if applicable | | | |
| Courses, if applicable | | | |
| Semester(s) in which the module is taught | First and second semesters | | |
| Person responsible for the module | Dr. Hana Alkhalidy | | |
| Lecturer | Will be assigned | | |
| Language | English | | |
| Relation to curriculum | Compulsory course in the second semester of the second year | | |
| Type of teaching, contact hours | 1 Credit Hours Lecture: 1 lecture | | |
| Workload | | Contact Hours | Private Study |
| | Lectures | 11 | 11 |
| | Assignments and in-class | 4 | 8 |
| | Term paper | 1 | 10 |
| | Presentation | 3 | 12 |
| | Total | 19 | 41 |
| | Total hours = 60 | | |
| Credit points | 2 ECTS | | |
| Requirements according to the examination regulations | | | |
| Recommended prerequisites | LG 101 pass | | |
| Module objectives/intended learning outcomes | <p>Course Objectives:</p> <p>By the end of this course, students will be able to:</p> <ol style="list-style-type: none"> 1. Understand the importance of writing in a scientific way in agricultural sciences. 2. Identifying and searching sources of scientific literature. | | |

| Module designation | Scientific Writing |
|--|---|
| | <p>3. Develop skills in writing different types of scientific documents commonly used in agricultural research and summarizing data into meaningful tables and figures.</p> <p>4. Apply appropriate scientific writing conventions, including citation and referencing.</p> <p>5. Organizing and presenting scientific information in a clear and concise manner.</p> <p>6. Communicate scientific ideas to both specialized and general audiences.</p> <p>Course Learning Outcomes:</p> <p>Upon successful completion of the course, students will be able to:</p> <ol style="list-style-type: none"> 1. Understand the structure of scientific papers. 2. Apply appropriate writing techniques for scientific reports, proposals, and grant applications in agricultural sciences. 3. Develop and deliver effective scientific presentation related to agricultural sciences. |
| Content | <p><u>Course Topics:</u></p> <p>Introduction to Scientific Writing in Agricultural Sciences</p> <ul style="list-style-type: none"> • Importance of effective scientific writing in agricultural sciences • Ethical considerations and responsible conduct in scientific writing <p>Structure and Organization of Scientific Papers</p> <ul style="list-style-type: none"> • Abstracts, introductions, methods, results, and discussions • Paragraph and sentence structure for clarity and coherence <p>Scientific Writing Conventions</p> <ul style="list-style-type: none"> • Citation and referencing styles in agricultural sciences • Avoiding plagiarism and proper attribution <p>Scientific Presentations in Agricultural Sciences</p> <ul style="list-style-type: none"> • Effective presentation techniques • Designing visual aids and slides <p>Writing Scientific Reports in Agricultural Sciences</p> <ul style="list-style-type: none"> • Characteristics and components of scientific reports • Writing clear and concise reports <p>Writing Research Proposals and Grant Applications</p> <ul style="list-style-type: none"> • Structure and components of research proposals • Key elements for successful grant applications in agricultural sciences |
| Study and examination requirements and forms of examination | <p>Evaluation of student progress will be based on:</p> <ol style="list-style-type: none"> a. Students will complete a series of written assignments, including scientific abstracts, paper sections, reports, and proposals 30% b. Active participation in discussions, workshops, and group activities will be assessed. 10% |

| Module designation | Scientific Writing |
|---------------------------|---|
| | c. Students will work on writing a scientific term paper in agricultural sciences. 30% d. Students will deliver scientific presentations related to agricultural sciences. 30% |
| Media employed | PowerPoint slides, E-learning Moodle, lecture notes, and Microsoft Teams and/or Zoom meetings. |
| Reading list | <ul style="list-style-type: none"> - P.K. Ramachandran Nair , Vimala D. Nair. (2014).Scientific Writing and Communication in Agriculture and Natural Resources. Edition 1. Springer Cham. https://doi.org/10.1007/978-3-319-03101-9 - Rhonda Liss and Jason Davis. (2012). Effective Academic Writing Second Edition. Oxford University Press; Revised ed. Edition - Research articles |

| Module designation | Food Chemistry and Analysis | | |
|--|--|---------------|---------------|
| Module level, if applicable | Third Year | | |
| Code, if applicable | NF 371 | | |
| Subtitle, if applicable | | | |
| Courses, if applicable | | | |
| Semester(s) in which the module is taught | First and second semester | | |
| Person responsible for the module | Prof. Muhammad Hussein Al-u'datt | | |
| Lecturer | Prof. Muhammad Hussein Al-u'datt | | |
| Language | English | | |
| Relation to curriculum | Compulsory course in the first semester of the third year | | |
| Type of teaching, contact hours | 3 Credit Hours Lecture: 3 lectures | | |
| Workload | | Contact Hours | Private Study |
| | Lectures | 35 | 61 |
| | Assignments/exercise | 10 | 20 |
| | Exams | 4 | 20 |
| | Total | 49 | 101 |
| | Total hours = 150 | | |
| Credit points | 5 ECTS | | |
| Requirements according to the examination regulations | None | | |
| Recommended prerequisites | CHEM 233 pass, NF 275 pass | | |
| Module objectives/intended learning outcomes | <ol style="list-style-type: none"> 1. A study of the chemistry of the major components comprising food systems, such as lipids, proteins, carbohydrates and water. The relationship of these components to food stability is studied in terms of degradative reactions and processing. Also covered will be the principles of chemical and instrumental methods. 2. Develop and understanding of how individual food components contributes to the overall quality of foods. | | |

| Module designation | Food Chemistry and Analysis |
|---------------------------|--|
| | 3. Achieve an understanding of the chemical changes that take place with food components during processing and storage. 4. Recognize reactions and mechanisms important in food chemistry. 5. Be capable of designing and conducting experiments and interpreting data to understand important food chemistry principles. |
| Content | 1. Water - Properties of water. - Free and bound water, water activity and freezing of water in foods. - Low and intermediate moisture foods. - Chemical and physiochemical aspects of foods solutions. - Theories and applications of different moisture determination methods. 2. Proteins - Classification and distribution in foods. - Review structure and function. - Reactions of proteins during processing. - Water binding, browning phenomena in protein foods. - Major food proteins, unconventional food proteins. - Functional properties of proteins. - Theories and applications of different protein determination methods. 3. Carbohydrates - Review structure and reactions. - Chemistry of mono- and oligo saccharides found in foods. - Polysaccharides (starch, cellulose, pectin and gums) and their role in foods. - Enzymes acting on carbohydrates, sweetness of sugars. - Analytical methods for carbohydrate determination. 4. Lipids - Classification and distribution in foods. - Composition of fats and oils. - Deteriorative reactions of fats and oils (autoxidation, lipolysis, reversion). - Chemistry and technology of processing fats and oils. - Physical properties of fats and oils. - Effects of processing on functional properties and nutritive value. - Analytical methods for determining different physical and chemical characteristics of fat. 5. Minerals - Ash determination methods. - Principles and applications for elemental analyses. 6- Vitamins analysis |

| Module designation | Food Chemistry and Analysis |
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| Study and examination requirements and forms of examination | a. 35% Midterm Exam b. 10% Assignments c. 50% Final Exam |
| Media employed | Pow PowerPoint slides, E-learning Moodle, lecture notes, blackboard, and others. |
| Reading list | 1. Food Chemistry, 3rd edition", O.R. Fennema, Ed. Marcel and Dekker, Inc., New York, NY. 1996. 2. Introduction to the Chemical Analysis of Foods, S. Suzanne Nieleeson, ed., Jones and Bartlett, London, UK. 1994. 3. Food Chemistry, Translation from the second German edition, H.-D. Belitz and W. Grosch, Springer-Verlag, Berlin, 1987. 4. Food Chemistry – A Laboratory Manual, Dennis D. Miller. 1998. John Wiley & Sons Principles of Food Chemistry, Second Edition (J.M. deMan), Van Nostrand Reinhold, NY. 1990. |

| Module designation | Food Chemistry and Analysis Laboratory | | |
|--|--|----------------------|----------------------|
| Module level, if applicable | Third Year | | |
| Code, if applicable | NF372 | | |
| Subtitle, if applicable | | | |
| Courses, if applicable | | | |
| Semester(s) in which the module is taught | First and second semesters | | |
| Person responsible for the module | Eng. Ranya esoh | | |
| Lecturer | Eng. Ranya esoh | | |
| Language | English | | |
| Relation to curriculum | Compulsory course in the first semester of the third year | | |
| Type of teaching, contact hours | 1 Credit Hours Lab session: 1 Lab | | |
| Workload | | Contact Hours | Private Study |
| | Lab sessions | 32 | 25 |
| | Exercises/assignments | 10 | 10 |
| | Exams | 3 | 10 |
| | Total | 45 | 45 |
| | Total hours = 90 | | |
| Credit points | 3 ECTS | | |
| Requirements according to the examination regulations | None | | |
| Recommended prerequisites | CHEM 234 pass, NF 371 Or concurrent | | |
| Module objectives/intended learning outcomes | Objectives: <ol style="list-style-type: none"> 1. Understand the chemistry and the analysis of most food components, including the behaviour of food components- on storage, processing and cooking. 2. Recognize food quality in the food analysis laboratory. 3. Understanding the basic composition, structure, and properties of foods and the chemistry of changes occurring during processing and utilization. 4. Provide students with lab skills to cover the principle methods and techniques necessary for quantitative physical and chemical analyses of food and products. | | |

| Module designation | Food Chemistry and Analysis Laboratory |
|--|--|
| | <p>5. Be able to relate food analysis results to the standards and regulations for food processing.</p> <p>Learning outcomes:</p> <ol style="list-style-type: none"> 1. Be familiar with the main and major procedures needed for analysis and also be familiar with the laboratory techniques. 2. To determine and explain the variation in the chemical composition of different foods. 3. To gain and possess the necessary skills for sample preparation, handling, running some equipment and instruments commonly used in food analysis lab such as vacuum oven, fiber tech, Kjeldal tech, spectrophotometer, Soxhlet and others. 4. To develop and gain skills such as critical thinking, discussion, participation, team-work and writing skills. |
| Content | <ol style="list-style-type: none"> 1. Safety regulations during the laboratory 2. Proximate analysis 3. Vitamin C determination 4. Water holding capacity. 5. Water hardness 6. Proteins in milk 7. Preservatives determination 8. HPLC 9. GC |
| Study and examination requirements and forms of examination | <ol style="list-style-type: none"> a. 15% reports b. 35% Mid Exam c. 20 % Project d. 30% Final Exam |
| Media employed | Teaching material and notes on E-learning, Laboratory work (Experiments in the lab.) |
| Reading list | <ol style="list-style-type: none"> 1. Coultate, T. P. 1996 . Food, The chemistry of its components . RS. C . UK 2. Wood Roger; Anders Nilsson; Harriet Wallin.1998 . Quality in the Food Analysis Laboratory RSC . Food Analysis Monograph . UK. 3. Ctruenwedel, Dieter . W; John R. whitaker. 1987 . Food Analysis, Principles and Techniques. Marcel Dekker, Inc. USA. 4. Macrae , R. 1988 . HPLC in Food Analysis.Academic press. UK . 5. Osborne, B.G.; T.Fearn. 1986 . Near Infrared Spectroscopy In Food Analysis. Longman Scientific Technical . USA. 6. Munck, lars . 1989 . Fluorescence Analysis In Foods . Longman Scientific Technical . UK. 7. Pearson, D.; R.S. kirk;and R. sawyer, 2019. Pearson's composition and Analysis of food 9th Edn. Longman |

| Module designation | Food Chemistry and Analysis Laboratory |
|---------------------------|---|
| | <ol style="list-style-type: none"><li data-bbox="394 268 1377 373">8. Jeon, j and W.G. Ikins, 1995 Analyzing Food for Nutrition Labelling and azzous contaminants. Dekker, New York Labelling and Hazzardous contaminants . Dekker New youk U.S. A.<li data-bbox="394 373 1252 411">9. Fennema,O.R. 1885.Food chemistry. Marcel dekker,Inc.U.S.A.<li data-bbox="394 411 1446 470">10. wong,D.S.1996-Mechavism abd theory in Food chemistry.CBS publishers and Dstributors |

| Module designation | Food Technology | | |
|--|--|---------------|---------------|
| Module level, if applicable | Third Year | | |
| Code, if applicable | NF 375 | | |
| Subtitle, if applicable | | | |
| Courses, if applicable | | | |
| Semester(s) in which the module is taught | First and Second semesters | | |
| Person responsible for the module | Prof. Taha Rababah | | |
| Lecturer | Prof. Taha Rababah | | |
| Language | English | | |
| Relation to curriculum | Compulsory course in the first semester of the third year | | |
| Type of teaching, contact hours | 3 Credit Hours Lecture: 2 Credit Practical: 1 Credit | | |
| Workload | | Contact Hours | Private Study |
| | Lectures | 30 | 58 |
| | Laboratory session | 42 | 24 |
| | Exams | 4 | 22 |
| | Total | 76 | 104 |
| | Total hours = 180 | | |
| Credit points | 6 ECTS | | |
| Requirements according to the examination regulations | | | |
| Recommended prerequisites | HSS103PHY pass, NF 275 | | |
| Module objectives/intended learning outcomes | <p>Objectives</p> <ol style="list-style-type: none"> 1. Develop a processing sequence of unit operations and make initial suggestions on equipment, machinery and quality parameters for a wide-variety of processed foods. 2. To introduce and illustrate the interaction among the influences on the processing requirements of individual foods. 3. To solve simple numerical problems associated with processing of foods, including thermal death kinetics 4. To interpret the impact of processes on food product quality. | | |

| Module designation | Food Technology |
|--|---|
| | <p>5. To learn to communicate food processing information to classmates and general audience via written/ oral reports.</p> <p>6. Students will have hands-on experience working with industrial associates to develop the skills they will need to work in the food industry. These include, but are not limited to: thermal processing calculations, heating characteristics, thermal death times, retort operations, can tear-down, quality evaluations of a wide-variety of food products.</p> <p>Intended learning outcomes</p> <ol style="list-style-type: none"> 1. Set up to learn about the principles of, and equipment for, processing of food with heat addition or removal, with deeper understanding of how different processing conditions and methods can affect the safety and quality of resulting food products. Important thermal food processing and preservation methods will be discussed. 2. Identify and define key terms and explain processing and engineering principles related to addition or removal of heat in food and resulting quality. 3. Solve simple numerical problems associated with processing of foods, including thermal death kinetics 4. Interpret solutions for the thermal and non-thermal processing and using two example of food modern preservations. |
| Content | <ol style="list-style-type: none"> 1. Introduction 2. Thermal Processing principles 3. Pasteurization & Blanching 4. Commercial Sterilization 5. Refrigerated Storage 6. Freezing and Frozen-Food Storage 7. Liquid Concentration 8. Dehydration 9. Food Extrusion 10. Irradiation 11. Microwave and microwave-assisted technology |
| Study and examination requirements and forms of examination | <ol style="list-style-type: none"> a. Midterm exam 35% b. Lab quizzes and Reports: 15% c. Lab Final Exam: 10% d. Theoretical Final Exam: 40% |
| Media employed | PowerPoint slides, E-learning Moodle, lecture notes, blackboard, and others |
| Reading list | <p>Principles of Food Processing, Dennis Heldman & Richard Hartel, Springer 1999, 3rd Edition, http://link.springer.com/book/10.1007%2F978-1-4615-6093-7.</p> <p>1- Principles of Food Processing, Dennis Heldman & Richard Hartel, Springer 1999, 3rd Edition.</p> |

| Module designation | Food Technology |
|---------------------------|---|
| | 2- Food Processing Technology: Principles and Practice (Woodhead Publishing Series in Food Science, Technology and Nutrition) 4th Edition by P.J. Fellows (Author), 2017. 3- Microwave-assisted Extraction for Bioactive Compounds, Theory and Practice, 2013. https://link.springer.com/book/10.1007/978-1-4614-4830-3 . |

| Module designation | Food Microbiology | | |
|--|--|---------------|---------------|
| Module level, if applicable | Third Year | | |
| Code, if applicable | NF 377 | | |
| Subtitle, if applicable | | | |
| Courses, if applicable | | | |
| Semester(s) in which the module is taught | Second semester | | |
| Person responsible for the module | Prof. Anas Al-Nabulsi | | |
| Lecturer | Prof. Anas Al-Nabulsi | | |
| Language | English | | |
| Relation to curriculum | Compulsory course in the third year | | |
| Type of teaching, contact hours | 3 Credit Hours Lecture: 2 Credit Hours Practical: 1 Credit Hour | | |
| Workload | | Contact Hours | Private Study |
| | Lectures | 30 | 58 |
| | Laboratory sessions | 42 | 22 |
| | Exams | 4 | 24 |
| | Total | 76 | 104 |
| | Total hours = 180 | | |
| Credit points | 6 ECTS | | |
| Requirements according to the examination regulations | None | | |
| Recommended prerequisites | BT 231 pass, NF 275 | | |
| Module objectives/intended learning outcomes | <p>By the end of successful completion of this course, the student will be able to:</p> <ol style="list-style-type: none"> 1. Study the intrinsic/extrinsic factors affecting the growth, survival and death of microorganisms in foods. 2. Explain the different factors that take place during food processing and how food can be contaminated in the food continuum (pre and post-harvest level). 3. Describe the microbial spoilage of different food products 4. Describe the role of beneficial microorganisms in food processing, preservation and safety, and their potential health benefits | | |

| Module designation | Food Microbiology |
|--|--|
| | 5. Understand advantages and disadvantages of different food preservation methods and their implications to microbial food safety and food quality. 6. Demonstrate the use of appropriate lab techniques commonly used in the food microbiology laboratory. |
| Content | 1. Microorganisms Important in Food Microbiology 2. Factors affecting the growth, death and survival of microorganisms in foods (Intrinsic factors) 3. Factors affecting the growth, death and survival of microorganisms in foods (Extrinsic factors) 4. Microbial spoilage of meat and meat product 5. Microbial spoilage of vegetables 6. Microbial spoilage of milk and milk products 7. Bio-preservation technology 8. Chemical methods of food preservat 9. Physical methods of food preservation 10. Hurdle Technology of food preservation |
| Study and examination requirements and forms of examination | a. First Exam: 20% b. Second Exam: 20% c. Lab Exams: 10% d. Lab Reports: 10% e. Lab Final Exam: 10% f. Theoretical Final Exam: 30% |
| Media employed | PowerPoint slides, E-learning Moodle, lecture notes, blackboard, and others |
| Reading list | 1. Modern Food Microbiology (ed) J.M. Jay, 7 th ed. Aspen Publishers Inc. Gaithersberg MD 2. Food Microbiology: Fundamentals and Frontiers. 4 th . Doyle, M. P., Beuchat, R. L. and Montville, T. J. (eds) ASM Press, Washington, D.C. 3. Selected Review Articles |

| Module designation | Diet Therapy 1 | | |
|--|---|---------------|---------------|
| Module level, if applicable | Third Year | | |
| Code, if applicable | NF381 | | |
| Subtitle, if applicable | | | |
| Courses, if applicable | | | |
| Semester(s) in which the module is taught | First semester | | |
| Person responsible for the module | Dr Hadil S Subih | | |
| Lecturer | Dr Hadil S Subih | | |
| Language | English | | |
| Relation to curriculum | Compulsory course in the First semester of the third year | | |
| Type of teaching, contact hours | 3 Credit Hours Lecture: 2 Credit Practical: 1 Credit | | |
| Workload | | Contact Hours | Private Study |
| | Lectures | 30 | 58 |
| | Laboratory session | 42 | 22 |
| | Exams | 4 | 24 |
| | Total | 76 | 104 |
| | Total hours = 180 | | |
| Credit points | 6 ECTS | | |
| Requirements according to the examination regulations | None | | |
| Recommended prerequisites | NF 282 pass, NF 284 pass, NF 288 pass | | |
| Module objectives/intended learning outcomes | <p>The aim of this course is to gain essential knowledge and skills regarding pathophysiology, biochemical and behavioral abnormalities and diseases and the nutritional/therapy for each disease. Upon the completion of this course, The students should be able to:</p> <ol style="list-style-type: none"> 1. Understand the steps and definition of NCP and apply it at any patient 2. Know the diseases and the biochemical tests and the major signs and symptoms, complications, procedures and treatment for each one. 3. Able to design an appropriate nutritional intervention for different diseases. | | |

| Module designation | Diet Therapy 1 |
|--|---|
| Content | <ol style="list-style-type: none"> 1. Nutrition Care Process (NCP) 2. PEM (marasmus) 3. PEM (Kwashiorkor) 4. Stress and Injury 5. Endocrine disorders 6. Diabetes Mellitus (DM) 7. Hepatic diseases 8. Gallbladder 9. Pancreatic disorders |
| Study and examination requirements and forms of examination | <ol style="list-style-type: none"> a. First Exam: 15% b. Second Exam: 15% c. Lab Assessment: 20% d. Final Exam: 50% |
| Media employed | PowerPoint slides, E-learning Moodle, lecture notes, blackboard, and others |
| Reading list | <ol style="list-style-type: none"> 1. Handout 2. Nutrition therapy and pathophysiology.4th edition , 2011 |

| Module designation | Diet Therapy 2 | | |
|--|--|----------------------|----------------------|
| Module level, if applicable | Third Year | | |
| Code, if applicable | NF 382 | | |
| Subtitle, if applicable | | | |
| Courses, if applicable | | | |
| Semester(s) in which the module is taught | Second semester | | |
| Person responsible for the module | Dr Hadil S Subih | | |
| Lecturer | Dr Hadil S Subih | | |
| Language | English | | |
| Relation to curriculum | Compulsory course in the second semester of the third year | | |
| Type of teaching, contact hours | 3 Credit Hours Lecture: 2 Credit Practical: 1 Credit | | |
| Workload | | Contact Hours | Private Study |
| | Lectures | 30 | 58 |
| | Laboratory session | 42 | 22 |
| | Exams | 4 | 24 |
| | Total | 76 | 104 |
| | Total hours = 180 | | |
| Credit points | 6 ECTS | | |
| Requirements according to the examination regulations | None | | |
| Recommended prerequisites | NF 282 pass, NF 284 pass, NF 288 pass | | |
| Module objectives/intended learning outcomes | <p>1. Gain essential knowledge and skills regarding pathophysiology, biochemical and behavioral abnormalities and diseases and the nutritional/therapy for each disease. 1) Identify the physiology basis, abnormal laboratory parameters, complementary/alternative therapies</p> <p>2. Use the nutrition care process to make decisions, to identify nutrition-related problems and determine and evaluate nutrition interventions for disorders</p> <p>3. Calculate calorie, protein, fluid, and electrolyte needs and nitrogen balance</p> | | |

| Module designation | Diet Therapy 2 |
|--|--|
| | 4. Develop interventions to affect change and enhance wellness in diverse individuals and groups |
| Content | 1. Introduction 2. CVD 3. Hypertension (HTN) 4. Cancer (CA) 5. Upper Gastrointestinal diseases 6. Lower Gastrointestinal diseases 7. Pulmonary diseases 8. Renal Diseases |
| Study and examination requirements and forms of examination | a. First Exam: 15% b. Second Exam: 15% c. Lab Assessment: 20% d. Final Exam: 50% |
| Media employed | PowerPoint slides, E-learning Moodle, lecture notes, blackboard, and others |
| Reading list | 1. Handout 2. Nutrition therapy and pathophysiology. 4th edition , 2011 |

| Module designation | Nutritional Status Assessment | | |
|--|--|---------------|---------------|
| Module level, if applicable | Third Year | | |
| Code, if applicable | NF 383 | | |
| Subtitle, if applicable | | | |
| Courses, if applicable | | | |
| Semester(s) in which the module is taught | First semester | | |
| Person responsible for the module | Dr. Hana Alkhalidy | | |
| Lecturer | Dr. Hana Alkhalidy | | |
| Language | English | | |
| Relation to curriculum | Compulsory course in the first semester of the third year | | |
| Type of teaching, contact hours | 3 Credit Hours Lecture: 2 Credit Practical: 1 Credit | | |
| Workload | | Contact Hours | Private Study |
| | Lectures | 30 | 58 |
| | Laboratory session | 42 | 22 |
| | Exams | 4 | 24 |
| | Total | 76 | 104 |
| | Total hours = 180 | | |
| Credit points | 6 ECTS | | |
| Requirements according to the examination regulations | None | | |
| Recommended prerequisites | NF 381, Or NF 382, Or concurrent | | |
| Module objectives/intended learning outcomes | <p>Objectives:</p> <ol style="list-style-type: none"> 1. To study the steps of the nutrition care process and the importance of nutritional assessment as the fundamental part of nutritional diagnosis 2. To learn the tools of nutritional assessment (specified for age and gender of the population being investigated) such as the anthropometric, biochemical, nutrition-focused physical examination, and dietary and history assessment. 3. To recognize the specificity and sensitivity of the assessment tools and the biomarkers used to identify a specific health indicator. | | |

| Module designation | Nutritional Status Assessment |
|--|--|
| | <p>4. To identify a nutritional-related problem through the link between the outcomes of the assessment tools.</p> <p>5. To implement some of the methods and tools learned in the course and any nutrition-related information obtained from credible sources of reference materials and referral systems used by nutrition professionals to provide optimal nutritional care for individuals.</p> <p>Learning outcomes:</p> <ol style="list-style-type: none"> 1. Define the nutrition care process and the 4 core steps in the process including the assessment, diagnosis, intervention, and evaluation and mentoring. 2. Be familiar with each assessment tool and identify the proper parameter for assessment based on gender, age, and medical condition. 3. Distinguish between the different tests and models used to interpret the data collected from the nutritional assessment tools for establishing a nutritional diagnosis. 4. Identify a nutrition-related problem by correlating the findings from the nutrition assessment tools and use it for the nutrition diagnosis. 5. To self-assess and evaluate the student nutrition status from information, which is obtained from the methods and tools, learned in the course. |
| Content | <ol style="list-style-type: none"> 1. Nutrition care process 2. Nutrition assessment of adults 3. Pediatric nutrition assessment 4. Nutrition assessment of the elderly 5. Nutrition assessment of pregnant women 6. Nutrition assessment of lactating women |
| Study and examination requirements and forms of examination | <ol style="list-style-type: none"> a. 35% Midterm exam b. 15% Lab assignments and exercises c. 10 % Lab final exam d. 40% Final Exam |
| Media employed | PowerPoint slides, E-learning Moodle, lecture notes, and Teams meetings. |
| Reading list | <ol style="list-style-type: none"> 1. Morrison, Inc. (2013). Manual of Clinical Nutrition Management. 14th edition. Compass Group, Inc. 2. Lee RD, Nieman, DC. (2013). Nutritional Assessment. 6th ed. McGraw-Hill, New York, NY. 3. Mahan and Escott-Stump (2008). Food, Nutrition, and diet therapy, 12th ed. 4. Width M, Reinhard T. (2018). The essential pocket guide for clinical nutrition, 3rd ed. Philadelphia, Pennsylvania: Wolters Kluwer Health. |

| Module designation | Summer Training-Practical | | |
|--|---|---------------|---------------|
| Module level, if applicable | Third Year | | |
| Code, if applicable | NF 399 | | |
| Subtitle, if applicable | | | |
| Courses, if applicable | | | |
| Semester(s) in which the module is taught | Summer semester | | |
| Person responsible for the module | Dr. Hana Alkhalidy | | |
| Lecturer | Dr. Hana Alkhalidy Prof. Taha Rababah Dr. Hadil S Subih Prof. Ziad Jaradat Dr. Bayan Obeidat Prof. Muhammad Hussein Al-u'datt Prof Anas Al-Nabulsi | | |
| Language | English | | |
| Relation to curriculum | Compulsory course in the summer semester of the third year | | |
| Type of teaching, contact hours | 6 Credit Hours, practical A capstone course after a completion of 90 credit hours. The student will get training for 7-8 weeks on campus, hospital settings, factories and different work sites. | | |
| Workload | | Contact Hours | Private Study |
| | Practical training | 144 | 120 |
| | Report preparation | 0 | 84 |
| | Exam | 2 | 40 |
| | Total | 146 | 244 |
| | Total hours = 390 | | |
| Credit points | 13 ECTS | | |
| Requirements according to the examination regulations | | | |
| Recommended prerequisites | Completion of 90 credit hours and NF 371, and NF 377, and NF383, and NF 381 or 382 | | |

| Module designation | Summer Training-Practical |
|---|---|
| Module objectives/intended learning outcomes | <p>Objectives:</p> <ol style="list-style-type: none"> 1. Identify properties of food components, including water, carbohydrates, protein, lipids, and other nutrients. 2. Learn principles, methods, and techniques of qualitative and quantitative physical, chemical, and biological analyses of food and food ingredients. 3. Recognize pathogenic and spoilage microorganisms in foods 4. Integration and application of food science principles (food chemistry, microbiology, processing, etc.) 5. Recognize and apply food laws and regulations and management systems such as HACCP 6. Learn health facility rules and guidelines regarding the dress code, behavior, management system, documentation and filing. 7. Recognize the dietitian role in hospitals and clinical settings. 8. Learn the skills of interviewing the patients and data collection. 9. Practice the Nutrition Care Process steps (assessment, diagnosis, intervention, and monitoring and evaluation) in a clinical setting <p>Learning outcomes:</p> <ol style="list-style-type: none"> 1. Be able to apply the principles of food science to control and assure the quality of food products. 2. Understand government regulations required for the manufacture and sale of food products. 3. Understand the principles and current practices of processing techniques and the effects of processing parameters on product quality. 4. Be able to apply and incorporate the principles of food science in practical, real-world situations and problems. 5. Be able to provide nutrition care effectively through the following of the nutrition care process steps. 6. Be able to maintain nutritional status of a diverse community through the integration of scientific information and translation of research into practice. 7. Demonstrate counseling and education methods to facilitate behavior change and enhance wellness for diverse individuals and groups. 8. Show understanding of organization/ industry customs and practices and practice ethical standards appropriate to the internship site. 9. Practice appropriate workplace attitudes and individual responsibility. 10. Demonstrate effective verbal and written communication skills and demonstrate effective listening skills. 11. Participate well as a team member and build professional network |
| Content | <ol style="list-style-type: none"> 1. The course is a practical training divided into two sessions (food and nutrition training sessions) at the food factories, JFDA, and hospitals. 2. Due to COVID 19 pandemic, students were not allowed to train in hospitals or in JFDA, as a result, the department supervised the student training in the department labs, arranged factory visits, and had invited lecturers from the |

| Module designation | Summer Training-Practical |
|--|---|
| | <p>JFDA as a temporary alternative to cover all the learning objectives and to achieve the learning outcomes.</p> <ol style="list-style-type: none"> 3. Student are supervised by instructors and lab technicians in the two sessions. Students are required to work in teams, submit reports, discuss case study and present them. 4. Feedback on progress in the course will be regularly provided to students to give them opportunities to improve their performance. |
| Study and examination requirements and forms of examination | <ol style="list-style-type: none"> a. 25% Food training session: Food lab and factory visits reports, and attendance. b. 25% Nutrition training session case reports: Discussion, presentations, and attendance. c. 50% Final Exam |
| Media employed | PowerPoint slides, E-learning Moodle, lecture notes, and Teams meetings. |
| Reading list | None is required but many teaching materials (including noteguides, links and video, and virtual labs) are provided to students to help them prepare their internship reports. |

| Module designation | Food Laws and Regulation | | |
|--|---|---------------|---------------|
| Module level, if applicable | Fourth Year | | |
| Code, if applicable | NF 451 | | |
| Subtitle, if applicable | | | |
| Courses, if applicable | | | |
| Semester(s) in which the module is taught | First and second semesters | | |
| Person responsible for the module | Dr. Sana' Issa Bakhit Gammoh | | |
| Lecturer | Dr. Sana' Issa Bakhit Gammoh | | |
| Language | English | | |
| Relation to curriculum | Compulsory course in the second semester of the fourth year | | |
| Type of teaching, contact hours | 2 Credit Hours Lecture: 2 lectures | | |
| Workload | | Contact Hours | Private Study |
| | Lectures | 30 | 34 |
| | Exams | 4 | 22 |
| | Total | 34 | 56 |
| | Total hours = 90 | | |
| Credit points | 3 ECTS | | |
| Requirements according to the examination regulations | None | | |
| Recommended prerequisites | NF 371, NF 377 | | |
| Module objectives/intended learning outcomes | <p>Upon successful completion of this course, students should be able to:</p> <ol style="list-style-type: none"> 1. Learn about governments enacted food laws and regulations designed to ensure that foods are fit for human consumption. 2. Learn about that laws protect consumers from harm resulting from unsafe foods and from deception resulting from misrepresentation or fraud relating to certain established food quality characteristics. 3. Learn about agencies that enforce these food laws and regulations. | | |

| Module designation | Food Laws and Regulation |
|---------------------------|--|
| | <ol style="list-style-type: none"> 4. Learn about the term food in a food law that covers any unprocessed, semi-processed, or processed item that is intended to be used as food or drink. 5. Learn about food laws and regulations that govern the failure of a food to meet regulatory requirements relating to a standard of identity, the declared quantity, declared ingredients, or label claims, can be considered as misrepresentation, misbranding, or fraud. 6. Learn about the scope of food laws and regulations govern all aspects of food safety and aspects of food quality. 7. Learn about that in addition to food laws and regulations, food standards also establish requirements for the safety and quality of foods and it becomes a legal requirement when it is published as a part of food regulations. 8. Learn about the Codex Alimentarius a collection of standards for food quality, food suitability, and food safety. These food standards have been adopted by countries worldwide and are intended primarily to protect consumers and to facilitate international food trade. They include codes of practice such as The Codex General Principles of Food Hygiene, standards for maximum residual levels (MRL) for pesticides and for veterinary drugs in foods, and standards for specifications for food additives. 9. Learn about the Hazard analysis critical control point (HACCP) a system that identifies, evaluates, and controls hazards that are significant for food safety (Codex Alimentarius, 1997). a systematic approach to the identification, evaluation, and control of food safety hazards (NACMCF, 1997). HACCP, which is recognized for its science-based approach, consists of a set of seven principles that have been adopted internationally through the work of the Codex Alimentarius Commission. 10. Learn about the ISO International Organization for Standardization to assist all types and sizes of organizations to implement and operate effective quality management systems. |
| Content | <p>Food legislation should include the following aspects:</p> <ol style="list-style-type: none"> 1. Provide a high level of health protection 2. Include clear definitions to increase consistency and legal security 3. based on high quality, transparent, and independent scientific advice following risk assessment, risk management and risk communication 4. Include provision for the use of precaution and the adoption of provisional measures where an unacceptable level of risk to health has been identified and where full risk assessment could not be performed 5. Include provisions for the right of consumers to have access to accurate and sufficient information 6. Provide for tracing of food products and for their recall in case of problems 7. Include clear provisions indicating that primary responsibility for food safety and quality rests with producers and processors 8. Include obligation to ensure that only safe and fairly presented food is placed on the market 9. Recognise the country's international obligations particularly in relation to trade |

| Module designation | Food Laws and Regulation |
|---------------------------|---|
| | <p>10. Ensure transparency in the development of food law and access to information</p> <p>Food Act:</p> <ol style="list-style-type: none"> 1. Preliminary provisions 2. Interpretation (Meaning of food, processing and handling and safety and suitability. ets) 3. Primary duty of persons who trade in food 4. Regulatory roles (Principles governing relationships between Minister, chief executive, and territorial authorities) 5. Risk-based measures <ul style="list-style-type: none"> • Preliminary (classification of food sectors, application of risk-based measures and requirement to operate under applicable risk-based measure) • Food control plans (food control plan is a plan designed for a particular food business to identify, control, manage, and eliminate or minimise hazards or other relevant factors for the purpose of achieving safe and suitable food, taking into account) • Amendments to food control plans (Chief executive’s power to amend, replace, or revoke template or model) • Requirement to register food control plans 6. National programmes (is to set out provisions about the nature, content, and effect of a national programme) 7. Monitoring programmes (is to set out provisions) <p>Food Law</p> <ol style="list-style-type: none"> 1. Definition of food law 2. Food is considered as misrepresentation in case of: <ul style="list-style-type: none"> • If the food is an imitation to another food and it is not harmful, unless its label clearly contains that it is an imitation and the authorized agencies approves the label for use before handling the food • If the food does not comply with the technical rules for the label or is packaged or prepared in a misleading manner • If the food contains any permitted artificial substance, whether it is flavor, color, or a food additive without mention that on the label indicating that it addition is a requirement for food preparation. • If the food label is incorrect or contains information that misleads the consumer • The food label does not contain the following information: <ol style="list-style-type: none"> 1. The name of the food 2. The name of the producer or who packaged the product and the address of each 3. Statement of contents by weight or measurement 4. Statement of food ingredients arranged according to majority 5. Storage conditions if the food need special preservation or storage conditions |

| Module designation | Food Laws and Regulation |
|---------------------------|---|
| | <p>6. The date of food production and its expiration date if it is one of the food items that have a specific shelf life</p> <p>7. The food label contains words, phrases, or information that are not clearly visible, rendering them unreadable or understandable to the average person according to the usual circumstances of handling</p> <p>3. Food is considered adulterated in the following cases:</p> <ul style="list-style-type: none"> • If the food contains a food additive that is permitted and it is not permitted to use it in that product according to the technical rules • If the food contains a food additive that is approved for use in that product, but it contains a higher limit than what is stipulated or permitted and specified under the technical rules • If any of its components have been removed, or any change has been made to them, or they have been re-equipped, unless it is announced on its label and was such procedures permitted according to the requirements and regulations • If food with expired shelf life is handled (If any food is traded, its validity period has expired) • If any change is made to the shelf life of any food other than what is stated on its original label of that food. • If any food is handled under conditions or circumstances that render it unsafe or harmful to health <p>4. The food is considered unfit for human consumption in any of the following cases:</p> <ul style="list-style-type: none"> • If it contains a toxic or harmful substance with the exception of pesticides or contaminants that the technical rules or international standards specified their upper residual limits and are within the permitted limit • If it contains a food additive that is forbidden and harmful to health • If its organoleptic characteristics indicate that the food is contaminated with substances that are not of its nature, such as dirt, rotting, or totally or partially decomposed, taking into account the technical rules or standard specifications of the foodstuff • If it is the product of a sick animal whose product is not allowed for human consumption, or if a sick animal has died before its slaughter • If the package that contains the food is made of materials not intended to come into contact with food • If it is contaminated with radiation and the percentage of radioactivity in it is higher than the international permitted limit • If it contains hormones, chemicals, or veterinary drugs or residues from it and is in a percentage higher than the permitted limit according to technical rules or international standard specifications that allow the use of these substances or their residues in food |

| Module designation | Food Laws and Regulation |
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| | <p>Food standards standards contain the following eight clauses:</p> <ol style="list-style-type: none"> 1. Scope 2. Normative reference 3. Terms and definitions 4. Quality management system 5. Management responsibility 6. Resource management 7. Product realization 8. Measurement, analysis, and improvement <p>ISO 9000 quality system standards</p> <ol style="list-style-type: none"> 1. ISO 9000:2000 Quality management systems—fundamentals and vocabulary 2. ISO 9001:2000 Quality management systems—requirements 3. ISO 9004:2000 Quality management systems—guidelines for performance improvements <p>Standard ISO 17025:1999 addresses the technical competence required by laboratories to carry out specific tests and calibrations and is used by laboratory accreditation bodies worldwide</p> <p>HACCP Regulation</p> <ol style="list-style-type: none"> 1. HACCP-based programs to monitor and enforce food laws and regulations are essentially addressing food safety and fitness for use as human food 2. government agency monitor and enforce food safety aspects of laws and regulations |
| Study and examination requirements and forms of examination | <ol style="list-style-type: none"> a. Midterm 35 % b. Assignments 15% c. Final Exam 50% |
| Media employed | PowerPoint slides, E-learning Moodle, lecture notes, and others |
| Reading list | <ol style="list-style-type: none"> 1. FAO/WHO. 2003. Assuring Food Safety and Quality: Guidelines for Strengthening National Food Systems, FAO Food and Nutrition Paper No. 76, Rome 2. International Standard, ISO 9001, 3rd ed., 2000–12–15, Quality management systems— Requirements, ISO 2000, Geneva. 3. Hazard Analysis and Critical Control Point (HACCP) System and Guidelines for Its Application, Codex Alimentarius Commission, Joint FAO/WHO Food Standards Program, 1997, Rome, www.codexalimentarius.net/ |

| Module designation | Food Product Development and Sensory Evaluation | | |
|--|---|---------------|---------------|
| Module level, if applicable | Fourth Year | | |
| Code, if applicable | NF453 | | |
| Subtitle, if applicable | | | |
| Courses, if applicable | | | |
| Semester(s) in which the module is taught | Second semester | | |
| Person responsible for the module | Part time/Dr. Radwan Yousef Ajo | | |
| Lecturer | Part time/Dr. Radwan Yousef Ajo | | |
| Language | English | | |
| Relation to curriculum | Compulsory course in the second semester of the fourth year | | |
| Type of teaching, contact hours | 3 Credit Hours Lecture: 2 Credit Practical: 1 Credit | | |
| Workload | | Contact Hours | Private Study |
| | Lectures | 30 | 58 |
| | Laboratory session | 42 | 22 |
| | Exams and exercises | 4 | 24 |
| | Total | 76 | 104 |
| | Total hours = 180 | | |
| Credit points | 6 ECTS | | |
| Requirements according to the examination regulations | | | |
| Recommended prerequisites | NF 371, NF 375 | | |
| Module objectives/intended learning outcomes | Objectives <ol style="list-style-type: none"> 1. Develop an understanding of psychology and sensory physiology 2. Select and implement appropriate sensory methodology for a specified objective 3. Understand the capabilities and limitations of sensory tests 4. Gain experience in data collection, data analysis and interpretation of sensory data | | |

| Module designation | Food Product Development and Sensory Evaluation |
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| | <ol style="list-style-type: none"> 5. Develop written and oral communication skills 6. Gain experience with the preparation of executive summaries, describing: what was done; how it was done; what was found; and what was concluded. 7. Develop skills to critique sensory methodology, experimental design and statistical analyses in the food science literature 8. To understand the different aspects of the product development process from a food science perspective 9. To integrate food science concepts into the development of a food product in a group setting 10. To become familiar with science and business strategies to develop successful, safe, quality food products <p>Intended learning outcomes</p> <ol style="list-style-type: none"> 1. Have knowledge about sensory analysis in general and about different methods and know when to use them. 2. Be able to plan, organize and carry out the most common sensory tests and have the skill to arrange, interpret and report sensory data. 3. Be acquainted with setting design and its effect on sensory evaluation judges. 4. Be acquainted with panel recruitment, selection and training. 5. Have knowledge about sample preparation. 6. Have an understanding of the human perception processes. 7. Have knowledge of human senses anatomy and physiology. Be able to interpret and critically review scientific articles. 8. Understand the process of product development. 9. Be able to plan, organize and carry out product development projects. 10. Have knowledge of what kind of tools for project planning there are on the market. Be acquainted with what type of quality system can be used. |
| Content | <ol style="list-style-type: none"> 1. Introduction to sensory evaluation 2. physiological aspects of sensory evaluation 3. Sensory characteristics of food products, panelists, and conditions of ideal sensory evaluation environment 4. Design and requirements of sensory evaluation 5. Methods for Sensory Evaluation 6. Statistics in Sensory Evaluation 7. Introduction to food product development 8. Basics and stages of development of new food products 9. Role of improving processing, packaging and marketing strategy in products development 10. Patents, trademarks, labels, and regulatory issues in products development |
| Study and examination requirements and forms of examination | <ol style="list-style-type: none"> a. First Exam: 20% b. Second Exam: 20% c. Lab Reports: 10% d. Lab Final Exam: 10% e. Theoretical Final Exam: 40% |

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| Module designation | Food Product Development and Sensory Evaluation |
| Media employed | PowerPoint slides, E-learning Moodle, lecture notes, and others |
| Reading list | <ol style="list-style-type: none"> 1. Lawless, H. T. and Heymann H.(2010).Sensory Evaluation of Food, Principles and Practices. Springer New York Dordrecht Heidelberg London 2. Brody, Aaron L. _ Lord, John B. (eds.) - Developing New Food Products for a Changing Marketplace (2007, CRC Press) 3. Rogers L.(2018).Sensory Panel Management A Practical Handbook for Recruitment, Training and Performance. Woodhead Publishing 4. Lawless Harry T.(2013). Laboratory Exercises for Sensory Evaluation. Springer New York Heidelberg Dordrecht London. |

| Module designation | Food Quality Control | | |
|--|---|---------------|---------------|
| Module level, if applicable | Fourth Year | | |
| Code, if applicable | NF476 | | |
| Subtitle, if applicable | | | |
| Courses, if applicable | | | |
| Semester(s) in which the module is taught | First and second semesters | | |
| Person responsible for the module | Dr.Sana Issa Bakhit Gammoh | | |
| Lecturer | Dr.Sana Issa Bakhit Gammoh | | |
| Language | English | | |
| Relation to curriculum | Compulsory course taught in the second semester of the fourth year | | |
| Type of teaching, contact hours | 3 Credit Hours Lecture: 2 Credit Practical: 1 Credit | | |
| Workload | | Contact Hours | Private Study |
| | Lecture | 30 | 58 |
| | Laboratory session | 42 | 22 |
| | Exams | 4 | 24 |
| | Total | 76 | 104 |
| | Total hours = 180 | | |
| Credit points | 6 ECTS | | |
| Requirements according to the examination regulations | | | |
| Recommended prerequisites | NF 371 | | |
| Module objectives/intended learning outcomes | <p>Upon successful completion of this course, students should be able to:</p> <ol style="list-style-type: none"> 1. Learn about food laws compliance with an effective manner to protect from danger (contaminated foods) and ensure that consumers get the proper quality and weight per payments, and to provide protection to the business from cheating by its suppliers, damage to equipment (stones in raw materials) and false accusations by customers, suppliers and middle men | | |

| Module designation | Food Quality Control |
|---------------------------|--|
| | <ol style="list-style-type: none"> 2. Learn about the principles and practices identified with safety and quality in the food industry based on laws and government regulations, as well as the requirements and expectations of customers and consumers. 3. Learn about the food quality and food safety requirements which are addressed through the use of systems and programs that include Quality management, Quality assurance, and Quality control. 4. Learn about the implementation of hazard analysis critical control point (HACCP) systems, and good manufacturing practices (GMPs). 5. Learn about a meaningful insight into the quality assurance aspects, it is necessary to break up the food quality and safety into model systems. 6. Learn about the scientific application and implementation of Quality and safety systems. 7. Learn about the practical sight of quality requirements in accordance to proper sampling and laboratories accreditation |
| Content | <ol style="list-style-type: none"> 1. Food Quality Assurance <ul style="list-style-type: none"> Principles and practices Food quality and food safety requirements systems Scope of food quality and food safety Responsibility for food quality and food safety The distinction between food quality and food safety Food safety as part of food quality Food quality Main objectives of quality control in food industry Factors affecting food quality and basic element of food quality assurance Ten basic elements of a quality assurance program Systems and programs for food quality Food safety Systems and programs for food safety Food laws and regulations Enforcement of food laws and regulations Food standards Food quality, food safety, and good manufacturing practices (GMPs) Food safety and hazards in foods Food safety hazards and health risk Biological hazards in foods Chemical hazards in foods Naturally occurring harmful compounds Agricultural residues Industrial contaminants Chemical residues Prohibited chemicals Food allergens Physical hazards in foods |

| Module designation | Food Quality Control |
|--|---|
| | <p>Free Radicals (Oxidation) Free radicals and human diseases</p> <p>2. Quality programs and quality systems for the food industry The distinction between quality programs and quality systems Quality control programs Quality assurance systems Quality management systems Total quality management Recognition programs and excellence models Quality system standard ISO 9000 quality system standards ISO 9000:2000 quality management systems - fundamentals and vocabulary Codex Alimentarius standard Rationale for quality management systems Requirements for quality management systems and requirements for products Relationship between quality management systems and excellence models</p> <p>3. GMPs and HACCP prerequisite programs Location Grounds Building exterior Building interior Structures Ventilation Drainage and sewage systems Change-rooms Washrooms and toilet rooms Employee facilities Lunchrooms and break-rooms Cleaning and sanitizing facilities Storage facilities Waste collection and storage facilities Water Ice and steam</p> <p>4. HACCP System Definition of HACCP History of HACCP Application of HACCP HACCP Principles</p> |
| Study and examination requirements and forms of examination | <p>a. First Exam: 20%</p> <p>b. Second Exam: 20%</p> <p>c. Practical: 20%</p> <p>d. Final Exam: 40%</p> |

| Module designation | Food Quality Control |
|---------------------------|---|
| Media employed | Power Point slides, E-learning Moodle, lecture notes, blackboard, and others |
| Reading list | <ol style="list-style-type: none"> 1. Alli I. (2004). Food Quality Assurance: Principles and Practices. CRC PRESS, Boca Raton London New York Washington, D.C. 2. Valko, M., Leibfritz, D., Moncol, J., Cronin, M.T.D., Mazur, M, and Telser, J. (2007). Free radicals and antioxidants in normal physiological functions and human disease. The Internationa Journal of Biochemistry and cell biology. 39, 44-84. 3. Aruoma, O. I. (1998). Free radicals stress, and antioxidant in human health and disease. Journal of American Oil Chemists' Society. 2 (75), 199-212. 4. CAC (1993). Codex Alimentarius Commission. Guideline for the application of the Hazard Analysis Critical Control Point (HACCP) System. In: Training Considerations for the Application of the HACCP System to Food Processing and Manufacturing, WHO/FNU/FOS/93.3 II, World Health Organization, Geneva. 5. CAC (1997). Codex Alimentarius Commission. Hazard analysis and critical control point (HACCP) System and Guidelines for its application. In General requirements (Food Hygiene) (2nd ed.) Supplement to Vol., 1B, FAO. pp. 33-45. |

| Module designation | Food Safety | | |
|--|---|---------------|---------------|
| Module level, if applicable | Fourth Year | | |
| Code, if applicable | NF 477 | | |
| Subtitle, if applicable | | | |
| Courses, if applicable | | | |
| Semester(s) in which the module is taught | First semester | | |
| Person responsible for the module | Prof. Tareq Osaili | | |
| Lecturer | Prof. Tareq Osaili Prof. Anas Al-Nabulsi Prof. Ziad Jaradat | | |
| Language | English | | |
| Relation to curriculum | Compulsory course in the first semester of the fourth year | | |
| Type of teaching, contact hours | 3 Credit Hours Lecture: 2 Credit Hours Practical: 1 Credit Hour | | |
| Workload | | Contact Hours | Private Study |
| | Lectures | 30 | 58 |
| | Exercises | 42 | 22 |
| | Exams | 4 | 24 |
| | Total | 76 | 104 |
| | Total hours = 180 | | |
| Credit points | 6 ECTS | | |
| Requirements according to the examination regulations | None | | |
| Recommended prerequisites | NF377 | | |
| Module objectives/intended learning outcomes | <p>By the end of successful completion of this course, the student will be able to:</p> <ol style="list-style-type: none"> 1. Describe food borne pathogens and their potential health hazards 2. Define food toxicants. 3. Explain microbial survival, growth and destruction in relation to food. 4. Apply food safety management. 5. List environmental and equipment sanitation requirement for food safety. | | |

| Module designation | Food Safety |
|--|--|
| | 6. Explore food chemical contaminants sources and control |
| Content | <ol style="list-style-type: none"> 1. Introduction to the course 2. Importance of food safety 3. Food safety and sanitation terms 4. Facts in foodborne diseases 5. Foodborne outbreaks: definition, investigation, incidence, cost, causes and affecting factors 6. Biological hazards lead to foodborne illnesses <ul style="list-style-type: none"> • Pathogen obstacles in human gut • Bacteria • Viruses • Parasites 7. Chemical hazards lead to foodborne illnesses <ul style="list-style-type: none"> • Fish and plant toxins • Mycotoxins • Antibiotics and growth hormones • Allergens and food additives • Pesticides and cleaning chemicals 8. Physical hazards lead to foodborne illnesses 9. Food safety management tools: <ol style="list-style-type: none"> 1. GMP 2. HACCP 3. ISO 22000 10. Group project presentations |
| Study and examination requirements and forms of examination | <ol style="list-style-type: none"> a. First Exam: 20% b. Second Exam: 20% c. Lab Exams: 10% d. Lab Reports: 10% e. Lab Final Exam: 10% f. Theoretical Final Exam: 30% |
| Media employed | PowerPoint slides, E-learning Moodle, lecture notes, blackboard, and others |
| Reading list | <ol style="list-style-type: none"> 1. Roberts, CA. 2001. Food Safety Information Handbook. Oryx Press, CT. ISBN 1-57356-305-6. 2. McSwane, D., Rue N. and Linton R. 2002. Essentials of Food Safety and Sanitation, 3rd ed. Prentice Hall- Pearson Education, Inc, Upper Saddle River, NJ ISBN 0-13-017371-1 3. Handout |

| Module designation | Dairy Products Technology | | |
|--|---|---------------|---------------|
| Module level, if applicable | Fourth Year | | |
| Code, if applicable | NF 479 | | |
| Subtitle, if applicable | | | |
| Courses, if applicable | | | |
| Semester(s) in which the module is taught | Second semester | | |
| Person responsible for the module | Dr.Sana Issa Bakhit Gammoh | | |
| Lecturer | Dr.Sana Issa Bakhit Gammoh | | |
| Language | English | | |
| Relation to curriculum | Compulsory course in the second semester of the fourth year | | |
| Type of teaching, contact hours | 3 Credit Hours Lecture: 2 Credit Practical: 1 Credit | | |
| Workload | | Contact Hours | Private Study |
| | Lecture | 30 | 58 |
| | Laboratory session | 42 | 22 |
| | Exams | 4 | 24 |
| | Total | 76 | 74 |
| | Total hours = 180 | | |
| Credit points | 6 ECTS | | |
| Requirements according to the examination regulations | None | | |
| Recommended prerequisites | NF 375 | | |
| Module objectives/intended learning outcomes | <p>Upon successful completion of this course, students should be able to:</p> <ol style="list-style-type: none"> 1. Learn about the various stages involved in the process of converting milk into consumable products including every step in the process from milk reception to storage and distribution (milk production from animal to market). 2. Learn about the milk collection including milking machines, farm bulk milk tanks and storage and transport of raw milk, and type of bacteria that may present in each. | | |

| Module designation | Dairy Products Technology |
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| | <ol style="list-style-type: none"> 3. Learn about the classification of processes group to enhance milks utilization and safety including fractionation such as centrifugal separation, membrane separation, ion exchange, precipitation and crystallization, filtration and homogenization, concentration such as evaporation, freeze concentration, membrane separation, drying and centrifugal separation, and preservation such as pasteurization, thermalization, and sterilization, chilling and freezing, reduction of pH, dehydration, salting and packaging. 4. Learn about the utilization of processes to manufacture products from milk such as fluid milk products, fermented milk products, milk powder products, casein products, milk fat (cream) products and whey products. 5. Learn about the changes to milk components during processing such as the effect of heating on destruction of bacteria, inactivation of enzymes, distraction of some vitamins, denaturation of whey proteins, shift of soluble salts to the colloidal phase, dephosphorylation of casein, maillard reaction, isomerization and degradation of lactose, changes to fat globule membrane and pH decrease, effect of evaporation on concentration of milk solids, increase of colloidal salts, increase in micelle size, decrease in pH and limited denaturation of whey proteins, effect of homogenization on the increase in number of fat globule, adsorption of casein on fat globules, decrease of fat globule size and decrease in protein solubility, and effect of spray drying on rapid removal of water and relatively minor changes in protein. 6. Learn about the heat treatment, where a number of heat-induced transformations of milk components determine the functional properties of the final product such as biological safety, shelf-life, flavour, taste and texture. Fresh milk, cheese, milk powder and fermentation products such as yoghurt all require a different heat treatment, i.e. a specific temperature? time history. 7. Learn about the the basic heat treatments in the dairy industry are thermization for inactivation of psychotropic microorganisms, low pasteurization for inactivation of pathogenic microorganisms, high pasteurization for inactivation of all microorganisms but not spores and sterilization and UHT (ultra-hightemperature) treatment to destroy spores. The effect of the heat treatment on the final product quality depends on the combination of temperature and time applied; this determines the equipment selection. 8. Learn about the fouling of equipment by deposit formation on walls as a result of heat treatment is governed by specific reactions of milk components. These typical undesired reactions reduce the heat transfer coefficient, increase the pressure drop over heat treatment equipment, and increase product losses, resulting in higher operating costs. 9. Learn about the Reaction engineering approach applicable to the optimal design and operation of dairy heat-treatment equipment. 10. Learn about the impact of heating on the product properties, classification of the heat-induced (bio)-chemical reactions in milk, effect of the temperature-time history quantified, classification of heating processes and advanced heating |

| Module designation | Dairy Products Technology |
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| | <p>systems such as Extended shelf-life (ESL) milk and innovative steam injection (ISI) approach.</p> <ol style="list-style-type: none"> 11. Learn about the production lines of fluid market milk (pasteurized, UHT), cream, butter, ice cream, fermented products and cheese. 12. Learn about the three classes of contamination represent hazards in milk, include biological hazards, such as bacteria, fungi and other microbial pathogens, chemical hazards such as residues of medication in the lactating animal, pesticides and a variety of industrial and environmental contaminants that might contaminate the feed of the lactating animal and finally land in the milk, and physical hazards such as discarded hypodermic needles, fragments of metal or glass and any other foreign object that may have found its way into the milk products, e.g. hair, feed particles, somatic cells, etc. 13. Learn about the Application and implementation of the seven HACCP system principles and its prerequisite programs GMP in dairies plant and demonstrating this on ground in a dairy plant through answering a questionnaire concerning the implementation of HACCP system in food Company and accordingly submitting an evaluation report. |
| Content | <ol style="list-style-type: none"> 1. MILK PRODUCTS PROCESSES <ul style="list-style-type: none"> Stages of processes Milking equipment Storage and transport of raw milk Milk processing and equipment Utilization of processes to manufacture products from milk Changes to milk components during processing <ul style="list-style-type: none"> • THERMAL PROCESSING OF MILK Basic heat treatments Heat-induced changes of milk Heat-induced reactions in milk – bulk reactions Destruction of microorganisms Inactivation of enzymes Denaturation of proteins Loss of nutrients Formation of new components Heat-induced reactions in milk – surface reactions Reaction engineering approach PROCESSES Equipment Continuous indirect heating systems Continuous direct heating systems (Semi) Batch heating systems Classification of heating processes Thermization Pasteurization |

| Module designation | Dairy Products Technology |
|---------------------------|--|
| | <p>UHT Ultrahigh Temperature Treatment Sterilization Terms and expressions to characterize heat treatment processes Advanced processes Extended shelf-life (ESL) Innovative steam injection (ISI)</p> <ul style="list-style-type: none"> • MARKET MILKS <p>HEAT TREATMENTS FOR MARKET MILKS Pasteurization for limited product shelf life under refrigerated storage Ultra-Pasteurization (Extended Shelf-Life Milk) Ultra-High-Temperature Sterilization In-Container Sterilization The microflora and enzymatic activity of heat-treated market milks- influence on quality and shelf life Pasteurized Market Milks The Influence of Raw Milk Quality Microflora of Pasteurized Milk Ultra-pasteurized Milk UHT Sterilized Milk Microflora of UHT Milk</p> <p>2. DAIRY PRODUCT MANUFACTURING</p> <p>Cream Butter Ice cream Therapeutic milks Probiotic Prebiotics</p> <ul style="list-style-type: none"> • SAFETY AND QUALITY OF DAIRY PRODUCTS <p>Pathogens of special relevance Prions Viruses Rickettsiae Protozoa Bacteria Brucella Mycobacterium Enterobacteriaceae Salmonella Escherichia Yersinia Campylobacter jejuni Staphylococcus aureus Listeria monocytogenes Bacillus cereus</p> |

| Module designation | Dairy Products Technology |
|--|---|
| | Chemical hazards Mycotoxins Antimicrobials Industrial and environmental contaminants Dioxins Heavy metals Procedures to minimize risk of feed and milk contamination Physical hazards • APPLACATION OF PROCESS CONTROL MANAGEMENT TOOLS Total Quality Management (TQM) Quality System Quality Management Generic Requirements Barrier Hygiene Application of HACCP principles |
| Study and examination requirements and forms of examination | a. First Exam: 20% b. Second Exam: 20% c. Practical: 20% d. Final Exam: 40% |
| Media employed | Power Point slides, E-learning Moodle, lecture notes, blackboard, and others |
| Reading list | 1. Robison, k. R. (2002). Dairy Microbiology Handbook, Third edition, Edited by Richard K. Robinson, John Wiley and Sons, Inc., New York. 2. Britz, J. T., Robison, k. R. (2008). Advanced Dairy Science and Technology, Blackwell Publishing Ltd, Australia. 3. Belitz, H.D., Grosch, W., Schieberle, P. (2009). Food Chemistry, 4 th edition, Springer-Verlag Berlin Heidelberg, Germany. |

| Module designation | Nutritional Education and Counseling | | |
|--|--|----------------------|----------------------|
| Module level, if applicable | Fourth Year | | |
| Code, if applicable | NF485 | | |
| Subtitle, if applicable | | | |
| Courses, if applicable | | | |
| Semester(s) in which the module is taught | First and second semesters | | |
| Person responsible for the module | Dr Hadil S Subih | | |
| Lecturer | Dr Hadil S Subih | | |
| Language | English | | |
| Relation to curriculum | Compulsory course in first semester of the fourth year | | |
| Type of teaching, contact hours | 2 Credit Hours Lecture: 2 lectures | | |
| Workload | | Contact Hours | Private Study |
| | Lectures | 30 | 36 |
| | Exercises | 0 | 10 |
| | Exams | 4 | 10 |
| | Total | 34 | 56 |
| | Total hours = 90 | | |
| Credit points | 3 ECTS | | |
| Requirements according to the examination regulations | None | | |
| Recommended prerequisites | NF 381 Or NF 382 | | |
| Module objectives/intended learning outcomes | <p>The aim of this course is to enable the students to understand the skills of meeting the clients and assess their nutritional and educational needs, stating goals and objectives, implementing and evaluating instructions and documenting care provided.</p> <ol style="list-style-type: none"> 1. Identify appropriate strategies for the nutrition counseling role 2. Collect and analyze food and nutrition information in the clinical setting using a 24-hr dietary recall, food frequency questionnaire, dietary history, and food records. | | |

| Module designation | Nutritional Education and Counseling |
|--|--|
| | 3. Plan and facilitate dietary changes to improve food practices when indicated 4. Provide reinforcement to maintain improved and appropriate food practices 5. Evaluate the effectiveness of the helping process 6. Document assessment and plans for nutritional care in the client's medical |
| Content | 1. Introduction 2. Preparing to meet your client 3. Meeting your client 4. Building a relationship 5. Developing a nutrition care plan: Putting it all together 6. Promoting change to facilitate self-management 7. Making behavior change last |
| Study and examination requirements and forms of examination | a. 30% First Exam b. 30% Second Exam c. 40% Final Exam |
| Media employed | PowerPoint slides, E-learning Moodle, lecture notes, blackboard, and others |
| Reading list | 1. Handout 2. nutrition counseling skill development. 3rd edition, 2015 |

| | | | |
|--|--|----------------------|----------------------|
| Module designation | Graduation Project | | |
| Module level, if applicable | Fourth Year | | |
| Code, if applicable | NF 493 | | |
| Subtitle, if applicable | | | |
| Courses, if applicable | | | |
| Semester(s) in which the module is taught | First and second semesters | | |
| Person responsible for the module | Dr. Hana Alkhalidy | | |
| Lecturer | Will be assigned | | |
| Language | English | | |
| Relation to curriculum | Compulsory course in the first or second semester of the fourth year | | |
| Type of teaching, contact hours | 3 Credit Hours Lecture: 3 lectures | | |
| Workload | | Contact Hours | Private Study |
| | Lectures | 30 | 10 |
| | Assignments | 5 | 15 |
| | In-class activities | 5 | 15 |
| | Proposal preparation | 5 | 21 |
| | Project Report | 2 | 30 |
| | Presentation | 2 | 10 |
| | Total | 49 | 101 |
| | Total hours = 150 | | |
| Credit points | 5 ECTS | | |
| Requirements according to the examination regulations | | | |
| Recommended prerequisites | Completion of 90 credit hours and NF299 pass | | |
| Module objectives/intended learning outcomes | Course Objectives: By the end of this course, students will be able to: <ol style="list-style-type: none"> 1. Work on a real-world problem. 2. Work in a team or independently. | | |

| | |
|--|---|
| Module designation | Graduation Project |
| | <p>3. Search reliable literature, conduct project, prepare results, write the reports, and present them.</p> <p>Course Learning Outcomes:</p> <p>Upon successful completion of the course, students will be able to:</p> <ol style="list-style-type: none"> 1. Develop the capability to work independently or in a team with a problem-solving orientation. 2. Design, analyze, and implement a solution to a real-life problem. 3. Apply relevant ethical concepts during the course of the project. 4. Apply professional-quality in writing the project report. 5. Develop and deliver a presentation. |
| Content | <p>Course Topics:</p> <p>Week 1 Introduction to the Course</p> <p>Week 2 Overview of writing graduation project thesis/report</p> <p>Week 3 Chapter 1: Introduction: Problem Statement, Objectives and Scope</p> <p>Week 4 Proper referencing and plagiarism</p> <p>Week 5 Chapter 2: Literature Review</p> <p>Week 6 Document structure, writing research report efficiently.</p> <p>Week 7,8 Chapter 3: Methodology</p> <p>Week 9,10 Chapter 4: Results and Discussion</p> <p>Week 11 Tables and Figures</p> <p>Week 12 Chapter 5: Conclusion, writing the Abstract and updating</p> <p>Week 13 Thesis format</p> <p>Week 14 Checking the first draft</p> <p>Week 15 Final report and presentation</p> |
| Study and examination requirements and forms of examination | <p>Evaluation of student progress will be based on:</p> <ol style="list-style-type: none"> a. Students will complete a series of written assignments, exercises and in-class activities and discussion 20% b. Students will work on writing a research proposal 20% c. Students will work on completing their project and writing a final report 30% d. Students will deliver scientific presentations of their project 30% |
| Media employed | PowerPoint slides, E-learning Moodle, lecture notes, and Microsoft Teams and/or Zoom meetings. |
| Reading list | <ul style="list-style-type: none"> - Mishra, S. B., & Alok, S. (2022). Handbook of research methodology. - Rhonda Liss and Jason Davis. (2012). Effective Academic Writing Second Edition. Oxford University Press; Revised ed. Edition - Research articles |

4- Department Elective Courses

| Module designation | Management of Food Establishments | | |
|--|--|---------------|---------------|
| Module level, if applicable | Third Year | | |
| Code, if applicable | NF 354 | | |
| Subtitle, if applicable | | | |
| Courses, if applicable | | | |
| Semester(s) in which the module is taught | Second semester | | |
| Person responsible for the module | Prof. Tareq Osaili | | |
| Lecturer | Prof. Tareq Osaili | | |
| Language | English | | |
| Relation to curriculum | Elective course in the third year | | |
| Type of teaching, contact hours | 3 Credit Hours Lecture: 3 lectures | | |
| Workload | | Contact Hours | Private Study |
| | Lectures | 45 | 51 |
| | Exercises | 0 | 20 |
| | Exams | 4 | 30 |
| | Total | 49 | 101 |
| | Total hours = 150 | | |
| Credit points | 5 ECTS | | |
| Requirements according to the examination regulations | None | | |
| Recommended prerequisites | NF 281, NF 275 | | |
| Module objectives/intended learning outcomes | Learning outcomes: 1. Comprehend the principles of management as professional practice, with emphasis in food service supply including organizational management, and production management. 2. Identify the food service systems in institutional and commercial food service facilities. | | |

| Module designation | Management of Food Establishments |
|--|---|
| | <ol style="list-style-type: none"> 3. Recognize the practical aspects of food safety and hygiene. 4. Demonstrate the principles and methods of foodservice cookery equipment. 5. Apply the principles of menu design for general commercial, and specialized institutional catering. 6. Understand the operation activities in institutional and commercial food service facilities. |
| Content | <ol style="list-style-type: none"> 1. Course overview: Introduction to food service industry, commercial and institutional food services 2. Consumer needs and types of foodservices 3. Food services management, responsibilities and skills 4. Menu and menu planning 5. Facility design and equipment selection 6. Operation of foodservice: purchasing and receiving 7. Operation of foodservice: storing, issuing and inventory control 8. Operation of foodservice: production and service 9. Food handling in foodservice establishments 10. Food safety system HACCP 11. Site-Visit: Hospital food service / kitchen operations 12. Operation of foodservice: cleaning and sanitation 13. Site-Visit: Catering company |
| Study and examination requirements and forms of examination | <ol style="list-style-type: none"> a. First Exam: 25% b. Second Exam: 25% c. Assignments: 10% d. Theoretical Final Exam: 40% |
| Media employed | PowerPoint slides, E-learning Moodle, lecture notes, blackboard, and others |
| Reading list | <ol style="list-style-type: none"> 1. Payne-Palacio, J. and Theis, M. (2009). Introduction to Food Service. 11th ed. Pearson Education, USA. 2. Handout |

| Module designation | Fruits and Vegetables Processing | | |
|--|---|----------------------|----------------------|
| Module level, if applicable | Third Year | | |
| Code, if applicable | NF376 | | |
| Subtitle, if applicable | | | |
| Courses, if applicable | | | |
| Semester(s) in which the module is taught | First semester | | |
| Person responsible for the module | Prof. Taha Rababah | | |
| Lecturer | Prof. Taha Rababah | | |
| Language | English | | |
| Relation to curriculum | Department Elective course in the third year | | |
| Type of teaching, contact hours | 3 Credit Hours Lecture: 3 lectures | | |
| Workload | | Contact Hours | Private Study |
| | Lectures | 45 | 61 |
| | Exercises | 0 | 10 |
| | Exams | 4 | 30 |
| | Total | 49 | 101 |
| | Total hours = 150 | | |
| Credit points | 5 ECTS | | |
| Requirements according to the examination regulations | None | | |
| Recommended prerequisites | NF 375 | | |
| Module objectives/intended learning outcomes | <p>Objectives: Fruits and vegetables processing course is designed to give students an overview of the unit food processing operations common to all types of food processing plants in fruits, vegetables and their products. The course emphasis is on developing basic skills expected of all food scientists Focus is on oral communications and critical thinking skills regarding of fruits and vegetable processing. With emphasis on packaging processing, and solving problems.</p> | | |

| Module designation | Fruits and Vegetables Processing |
|--|---|
| | <p>Learning Outcomes:</p> <ol style="list-style-type: none"> 1. The important basic concepts of Fruits and vegetable packaging 2. The unit operations used in Fruits and vegetables 3. The principles of food preservations 4. The source and variability of raw food material and how it affects various food processing operations during processing steps 5. The extent to which specific processing methods preserve foods by inactivation or destruction of enzymes and microorganisms |
| Content | <ol style="list-style-type: none"> 1. Introduction 2. General properties of fruit and vegetables, chemical composition and nutritional Aspects; structural features 3. Deterioration factors and their control <ul style="list-style-type: none"> • Enzymic changes • Chemical changes • Physical changes • Biological changes 4. Methods of reducing deterioration 5. General procedures for fruit and vegetable preservation 6. Auxiliary raw materials 7. Packaging materials 8. Fruit specific preservation technologies 9. Vegetable specific processing technologies 10. Quality control/quality assurance and international trade; good manufacturing practices (gmp); hygiene requirements; hazard analysis and critical control points (HACCP) 11. Fruit and vegetable processing units - general approach; preliminary study; how to invest install and operate a processing centre modular units: from farm/family to community/business level |
| Study and examination requirements and forms of examination | <ol style="list-style-type: none"> a. 25% First Exam b. 25% Second Exam c. 10 % Activities and quizzes d. 40% Final Exam |
| Media employed | PowerPoint slides, E-learning Moodle, lecture notes, and Teams or Zoom meetings. |
| Reading list | <ol style="list-style-type: none"> 1. Fruit and vegetable processing by Mircea Enachescu Dauthy, 1997. 2. Introduction to Food Science by Rick Parker, 2003. 3. Food Chemistry 3rd edition by Fennema and Marcel Dekker N.Y., 1996. 4. Food Science 5th edition by Potter & Hotchkiss. |

| Module designation | Cereals Processing and Products | | |
|--|---|----------------------|----------------------|
| Module level, if applicable | Third Year | | |
| Code, if applicable | NF 378 | | |
| Subtitle, if applicable | | | |
| Courses, if applicable | | | |
| Semester(s) in which the module is taught | First semester | | |
| Person responsible for the module | Part timer/Dr. Radwan Yousef Ajo | | |
| Lecturer | Part time/Dr. Radwan Yousef Ajo | | |
| Language | English | | |
| Relation to curriculum | Department Elective in the Third year | | |
| Type of teaching, contact hours | 3 Credit Hours Lecture: 3 lectures | | |
| Workload | | Contact Hours | Private Study |
| | Lectures | 45 | 61 |
| | Exercises | 0 | 10 |
| | Exams | 4 | 20 |
| | Total | 49 | 101 |
| | Total hours = 150 | | |
| Credit points | 5 ECTS | | |
| Requirements according to the examination regulations | None | | |
| Recommended prerequisites | Food Technology NF 375 | | |
| Module objectives/intended learning outcomes | <p>Objectives: Upon completion of this course, the student should be able to:</p> <ol style="list-style-type: none"> 1. Identify the different cereal grains produced and used worldwide for the production of human foods with special emphasis on cereal grains produced/ utilized 2. Characterize the chemical composition of edible cereal grains in relation to nutritional values and functional properties. | | |

| Module designation | Cereals Processing and Products |
|--|--|
| | <ol style="list-style-type: none"> 3. Understand the theory of storage of cereal grains in relation to maintaining grain quality and maximizing profits. 4. Understand the processes of dry and wet milling and recognize the end-products of this process and the use of these products in manufacturing human foods. 5. Understand properties of ingredients used in baking of breads and reactions of these ingredients during processing into baked products. 6. Classify and understand the ingredients and processes used for manufacturing of today's cereal grain-based food products (other than breads) such as cookies, cakes, breakfast cereals, pasta, noodles, flat breads, cereal-based snacks such as corn chips, etc. 7. Understand the functionality tests for wheat flours |
| Content | <ol style="list-style-type: none"> 1. Introduction to cereals and pseudocereals 2. Botanical Aspects 3. Physical Properties of Grains and Grading 4. Structure and Chemical Composition of Cereal Grains 5. Storage of Cereal Grains 6. Wheat Processing: Milling Operations 7. Manufacturing of Bakery Products 8. Manufacturing of Bakery Products: Pasta 9. Manufacturing of Breakfast Cereals 10. Industrial Production of Modified Starches and Syrups 11. Functionality Tests for Wheat Flours |
| Study and examination requirements and forms of examination | <ol style="list-style-type: none"> a. 25% First Exam b. 25% Second Exam c. 10 % Activities and quizzes d. 40% Final Exam |
| Media employed | PowerPoint slides, E-learning Moodle, lecture notes, and Teams or Zoom meetings. |
| Reading list | <ol style="list-style-type: none"> 1. Serna-Saldivar, S. O. (2010) Cereal Grains: Properties, Processing, and Nutritional Attributes, Taylor & Francis Group, LLC 2. Rosentrater, K. A and Evers, A.D. (2018). Kent's Technology of Cereals. 5edition. Woodhead Publishing |

| Module designation | Sports Nutrition | | |
|--|---|---------------|---------------|
| Module level, if applicable | Third Year | | |
| Code, if applicable | NF 386 | | |
| Subtitle, if applicable | | | |
| Courses, if applicable | | | |
| Semester(s) in which the module is taught | First and second semesters | | |
| Person responsible for the module | Hana Alkhalidy | | |
| Lecturer | Dr. Sofyan Maghaydah | | |
| Language | English | | |
| Relation to curriculum | Department Elective course in the Third year | | |
| Type of teaching, contact hours | 3 Credit Hours Lecture: 3 lectures | | |
| Workload | | Contact Hours | Private Study |
| | Lectures | 45 | 61 |
| | Exercises | 0 | 20 |
| | Exams | 4 | 20 |
| | Total | 49 | 101 |
| | Total hours = 150 | | |
| Credit points | 5 ECTS | | |
| Requirements according to the examination regulations | None | | |
| Recommended prerequisites | NF 284 | | |
| Module objectives/intended learning outcomes | <p>Objectives: This course provides foundational knowledge pertaining to the cellular utilization of energy- yielding nutrients during physical activity. This reflects into understanding the changes in nutritional needs depending on physical activity levels and types of exercise. The course also addresses water and micronutrient needs for exercise. The ultimate aim of this course is to teach students how to evaluate the nutritional needs related to various levels and types of physical</p> | | |

| Module designation | Sports Nutrition |
|--|--|
| | <p>activities, in order to be able to develop and prescribe adequate diet plans and supplements.</p> <p>Learning outcomes:</p> <ol style="list-style-type: none"> 1. Understanding the effect of exercise on human physiology and its role in health promotion. 2. Recognize the importance of optimal nutrition for physical performance. 3. Understand the metabolic changes in energy production during different types of exercise. 4. Estimate water, energy, macronutrient and micronutrient needs according to the levels and types of physical activity, and according to health status. 5. Evaluate the need for nutritional and sports supplementation to optimize physical performance and strength. 6. Explain strategies used in weight management for athletes 7. Discuss eating disorders that are common in this population. |
| Content | <ol style="list-style-type: none"> 1. Introduction to Nutrition for Health, Fitness, and Sports Performance 2. Healthful Nutrition for Fitness and Sport 3. Human Energy 4. Carbohydrates: The Main Energy Food 5. Fat: An Important Energy Source during Exercise 6. Protein: The Tissue Builder 7. Water, Electrolytes and Temperature Regulation 8. Nutritional Supplements and Ergogenic Aids |
| Study and examination requirements and forms of examination | <ol style="list-style-type: none"> a. 30% Midterm Exam b. 30% Second Exam c. 40% Final Exam |
| Media employed | PowerPoint slides, E-learning Moodle, lecture notes, and Teams meetings. |
| Reading list | <ol style="list-style-type: none"> 1. Williams, M. H., Rawson, E. S., & Branch, J. D. (2017). Nutrition for Health, Fitness, and Sport. 2. Mahan, L. K., & Raymond, J. L. (2016). Krause's food & the nutrition care process-e-book. Elsevier Health Sciences. |

| Module designation | Meat Science | | |
|--|--|----------------------|----------------------|
| Module level, if applicable | Fourth year | | |
| Code, if applicable | AP 446 | | |
| Subtitle, if applicable | | | |
| Courses, if applicable | | | |
| Semester(s) in which the module is taught | Second semester | | |
| Person responsible for the module | Prof. Abdullah Yousef Abdullah | | |
| Lecturer | Prof. Abdullah Yousef Abdullah | | |
| Language | English | | |
| Relation to curriculum | Compulsory course in the first or second semester of the fourth year | | |
| Type of teaching, contact hours | 3 Credit Hours Lecture: 3 lectures | | |
| Workload | | Contact Hours | Private Study |
| | Lectures | 45 | 81 |
| | Exams | 4 | 20 |
| | Total | 49 | 101 |
| | Total hours = 150 | | |
| Credit points | 5 ECTS | | |
| Requirements according to the examination regulations | None | | |
| Recommended prerequisites | NF 375 | | |
| Module objectives/intended learning outcomes | <p>Objectives:</p> <ol style="list-style-type: none"> 1. To assess the nutrient value of meat and its role in the diet. 2. To provide an understanding of the relationship between muscle anatomy, muscle composition, muscle structure, and the ultimate quality of meat. 3. To be familiar with meat processing technologies 4. To introduce and be familiar with the storage and preservation techniques of meat and meat by-product. 5. To learn the biochemical change of meat that happened during the conversion of muscle to meat and the physiological basis of meat quality characteristics. | | |

| Module designation | Meat Science |
|--|---|
| | 6. To know and study the pre-slaughter and the post-slaughter treatments that can have an effect on meat quality characteristics. |
| Content | <ol style="list-style-type: none"> 1. Introduction and an overview of the meat industry 2. Meat and human nutrition World meat production The red and the white meat and its role in the diet The main products and the by-products from meat animals 3. The muscle structure. The muscle fiber and the associated connective tissue. Muscle Function and the differences between muscle type 4. Factors reflected in specialized muscle function and Constitution. All related topics with different type of meat animals. 5. Normal and abnormal growth of muscle. 6. Chemical and Biochemical constitution of muscle, muscle proteins, Intramuscular fat. 7. The conversion of muscle to meat. Rigor mortis, Conditioning, Ageing Dealing with surrounding environment. 8. The spoilage of meat by infection Organisms. To have a basic knowledge on meat spoilage by different organisms Storage And Preservation of Meat – Temperature control. 9. The Eating Quality of Meat. Describe all meat quality characteristic Describe how the eating quality measured Describe all the factors affecting meat quality Describe all the techniques used to increased meat quality |
| Study and examination requirements and forms of examination | <ol style="list-style-type: none"> a. First Exam 30% b. Second Exam 30% c. Final Exam 40% |
| Media employed | PowerPoint slides, E-Learning Moodle, and Lecture Notes |
| Reading list | <ol style="list-style-type: none"> 1. Meat Science. R. A. Lawrie, Pergamon Press Ltd. (1985), Fourth Edition. 2. Meat Production and Processing. R. W. Purchas, B. W. Hogg, A. S. Davies, (1989), New Zealand Society of Animal Production – Occasional Publication No. 11. 3. Agricultural Extension Services, (Interactive Lessons from University of Illinois). |

| Module designation | Food Biotechnology | | |
|--|---|----------------------|----------------------|
| Module level, if applicable | Fourth Year | | |
| Code, if applicable | NF459 | | |
| Subtitle, if applicable | | | |
| Courses, if applicable | | | |
| Semester(s) in which the module is taught | Second semester | | |
| Person responsible for the module | Prof. Ziad Jaradat | | |
| Lecturer | Prof. Ziad Jaradat | | |
| Language | English | | |
| Relation to curriculum | Department Elective in the fourth year | | |
| Type of teaching, contact hours | 3 Credit Hours Lecture: 3 lectures | | |
| Workload | | Contact Hours | Private Study |
| | Lectures | 45 | 61 |
| | Exercises | 0 | 20 |
| | Exams | 4 | 20 |
| | Total | 49 | 101 |
| | Total hours = 150 | | |
| Credit points | 5 ECTS | | |
| Requirements according to the examination regulations | None | | |
| Recommended prerequisites | NF377 | | |
| Module objectives/intended learning outcomes | <p>Objectives: To introduce the students to certain biotechnological aspects and their relation to food production, detection of contaminants as well as regulation of the production and marketing genetically modified foods.</p> <p>Learning outcomes:</p> | | |

| Module designation | Food Biotechnology |
|--|---|
| | <p>By the end of the course students should demonstrate knowledge in the following main areas</p> <ol style="list-style-type: none"> 1. Demonstrate knowledge in basic concepts of traditional food fermentation 2. Demonstrate knowledge in microorganisms, plants and animal biotechnology and their relation to food enhancement and production 3. Demonstrate knowledge in basic genetic manipulations to produce genetically modified foods 4. Demonstrate knowledge in modern techniques of food analysis 5. Demonstrate knowledge in genetically modified foods legislation 6. Effectively communicate scientific ideas orally or and through writing on issues pertaining to food biotechnology. |
| Content | <p>The course will specifically cover the following topics</p> <ol style="list-style-type: none"> 1. Introduction to food biotechnology and Fermentation 2. Microorganisms used in food biotechnology 3. Large scale growth of microorganisms using batch, Fed Batch and continuous Fermenters 4. Upstreaming and down streaming processes in using microorganisms for production of vitamins, or other products 5. Animal biotechnology and its use for food production 6. Plant biotechnology and its use for food production 7. Enzymes used in food production 8. Genetically modified foods 9. Nutraceuticals and their impact on human health 10. Detection and identification of genetically modified foods 11. Using modern biotechnological methods (e.g PCR and ELISA) for the detection of food contaminants as well as food adulteration 12. Food biotechnology legislation and social and ecological issues pertaining to Food Biotechnology |
| Study and examination requirements and forms of examination | <ol style="list-style-type: none"> a. 25% First Exam b. 25% Second Exam c. 10 % Activities and quizzes d. 40% Final Exam |
| Media employed | PowerPoint slides, E-learning Moodle, lecture notes, and Teams or Zoom meetings. |
| Reading list | To be chosen by the instructor at the time of the course offering |

| Module designation | Meat Technology | | |
|--|--|----------------------|----------------------|
| Module level, if applicable | Fourth Year | | |
| Code, if applicable | NF 472 | | |
| Subtitle, if applicable | | | |
| Courses, if applicable | | | |
| Semester(s) in which the module is taught | First or Second semester | | |
| Person responsible for the module | Dr. Abdullah Yousef Abdullah | | |
| Lecturer | Dr. Abdullah Yousef Abdullah | | |
| Language | English | | |
| Relation to curriculum | Elective Course in the first or second semester of the fourth year | | |
| Type of teaching, contact hours | 3 Credit Hours Lecture: 3 lectures | | |
| Workload | | Contact Hours | Private Study |
| | Lectures | 45 | 81 |
| | Exams | 4 | 20 |
| | Total | 49 | 101 |
| | Total hours = 150 | | |
| Credit points | 5 ECTS | | |
| Requirements according to the examination regulations | None | | |
| Recommended prerequisites | NF 375 | | |
| Module objectives/intended learning outcomes | <p>Upon successful completion of this course the student should be able:</p> <ol style="list-style-type: none"> 1. To assess the nutrient value of processed meat products and its role in the diet 2. To list and describe all types of processed meat product and characteristics of each products. 3. Identify and recommend the types of meat and non-meat ingredients which would be used in various types of products, in order to formulate new product. 4. To be familiar with meat processing technologies. 5. Explain quality differences in raw materials and the resulting effects on finished processed product quality. | | |

| Module designation | Meat Technology |
|--|---|
| | 6. Describe the functions of non-meat ingredients used in meat processing 7. To introduce and be familiar with the storage and preservation techniques of meat and meat by-product. 8. Make recommendations regarding safe handling of processed meat products from processing plant to the final consumer. |
| Content | 1. Introduction and an overview of the meat processing industry <ul style="list-style-type: none"> • General Overview 2. Structure and growth of muscle <ul style="list-style-type: none"> • The growth of muscle • The structure of muscle • The composition of muscle • The conversion of muscle to meat. 3. Rigor mortis, Conditioning, Ageing 4. Dealing with surrounding environment 5. Water holding capacity and pH 6. Non-meat ingredients. 7. Salt, Nitrites/Nitrates, Sodium Ascorbate / Erythorbate. 8. Phosphates, Sugars and Sweeteners, Flavourings 9. Storage And Preservation of Meat – Temperature control. Packaging of meat, Canning 10. Processing techniques for meat products. <ul style="list-style-type: none"> • Raw materials, sectioned and formed meat products. • Curing, Smoking, Sausages and its types • Cookery methods for meat products 11. The storage and preservation techniques of meat and meat by-product. <ul style="list-style-type: none"> • Make recommendations regarding safe handling of processed meat products from processing plant to the final consumer. |
| Study and examination requirements and forms of examination | a. First Exam 30% b. Second Exam 30% c. Final Exam 40% |
| Media employed | PowerPoint slides, E-Learning Moodle, and Lecture Notes |
| Reading list | 1. The meat we eat. J.R. Romans, W.J. Costello, K.W. Jones, C.W. Carlson and P.T. Ziegler, Interstate printer and publisher, Inc., USA (1985), 12th ed. 2. Meat Science. R. A. Lawrie, Pergamon Press Ltd. (1985), Fourth Edition. 3. Meat Production and Processing. R. W. Purchas, B. W. Hogg, A. S. Davies, (1989), New Zealand Society of Animal Production – Occasional Publication No. 11. 4. Agricultural Extension Services, (Interactive Lessons from University of Illinois). 5. Some class notes and handouts will be supplied |

| Module designation | Food Engineering | | |
|--|--|----------------------|----------------------|
| Module level, if applicable | Fourth Year | | |
| Code, if applicable | NF475 | | |
| Subtitle, if applicable | | | |
| Courses, if applicable | | | |
| Semester(s) in which the module is taught | First, second and summer | | |
| Person responsible for the module | Prof. Taha Rababah | | |
| Lecturer | Prof. Taha Rababah | | |
| Language | English | | |
| Relation to curriculum | Department Elective course in the first or second semester of the fourth year | | |
| Type of teaching, contact hours | 3 Credit Hours Lecture: 3 lectures | | |
| Workload | | Contact Hours | Private Study |
| | Lectures | 45 | 61 |
| | Exercises | 0 | 20 |
| | Exams | 4 | 20 |
| | Total | 49 | 101 |
| | Total hours = 150 | | |
| Credit points | 5 ECTS | | |
| Requirements according to the examination regulations | None | | |
| Recommended prerequisites | NF375 | | |
| Module objectives/intended learning outcomes | <p>Objectives: This course is designed to teach students the fundamentals required for food engineering. Students will acquire knowledge of food engineering principles in food processing, such as flow characteristics of fluids, heat and mass transfer (and their combination), refrigeration, and the interaction of electromagnetic radiation with food materials in order to apply these fundamentals to various unit operations in the food industry.</p> | | |

| Module designation | Food Engineering |
|--|---|
| | <p>By the end of the course, the student should be able to:</p> <ol style="list-style-type: none"> 1. Identify the mechanisms by which various unit operations in food processing optimize food quality and extend the shelf life of foods. 2. Apply physical principles to understand why food components are processed in specific ways. 3. Justify the application of basic mathematical and principles to food processing issues. 4. Acquire specific success skills to prepare for a career in the food industry. <p>Learning outcomes:</p> <ol style="list-style-type: none"> 1. Students have fundamentals of the basic processes of food production with emphasis on the impact of individual processes on biological and nutritional value of foods. 2. They understand technological processes not requiring heat energy supply, processes requiring heat energy supply, and processes requiring the removal of heat energy. |
| Content | <ol style="list-style-type: none"> 1. Basic concepts and terms of food processes. 2. Processes without any thermal energy: cleaning, sorting, peeling, mixing, milling, mechanical separation etc. 3. Processes that require the application of thermal energy: blanching pasteurization, sterilization, evaporation, extrusion, drying, baking, microwave heating. 4. Processes that require removal of thermal energy: cooling, freezing, lyophilization. |
| Study and examination requirements and forms of examination | <ol style="list-style-type: none"> a. 25% First Exam b. 25% Second Exam c. 10 % Activities and quizzes d. 40% Final Exam |
| Media employed | PowerPoint slides, E-learning Moodle, lecture notes, and Teams or Zoom meetings. |
| Reading list | R.P. Singh, and D.R. Heldman. (2014). Introduction to Food Engineering, 5th Ed., Academic Press |

| Module designation | Food Packaging | | |
|--|---|----------------------|----------------------|
| Module level, if applicable | Fourth Year | | |
| Code, if applicable | NF 478 | | |
| Subtitle, if applicable | | | |
| Courses, if applicable | | | |
| Semester(s) in which the module is taught | First, second and summer | | |
| Person responsible for the module | Prof. Taha Rababah | | |
| Lecturer | Prof. Taha Rababah | | |
| Language | English | | |
| Relation to curriculum | Department Elective course in the the fourth year | | |
| Type of teaching, contact hours | 3 Credit Hours Lecture: 3 lectures | | |
| Workload | | Contact Hours | Private Study |
| | Lectures | 45 | 61 |
| | Exercises | 0 | 20 |
| | Exams | 4 | 20 |
| | Total | 49 | 101 |
| | Total hours = 150 | | |
| Credit points | 5 ECTS | | |
| Requirements according to the examination regulations | None | | |
| Recommended prerequisites | NF 375 | | |
| Module objectives/intended learning outcomes | <p>Objectives: This course is designed to introduce students to the physical principles and technology of packaging for the food industry with emphasis on the consequences to food stability and quality. Food packaging materials will be discussed with emphasis on their interaction with food products.</p> | | |

| Module designation | Food Packaging |
|--|---|
| | <p>Learning outcomes: Upon completion of this course, students will:</p> <ol style="list-style-type: none"> 1. Be able to discuss packaging related issues such as materials selection Forming techniques and packaging sealing with a packaging engineer. 2. Know how food packaging is manufactured. 3. Understand the material properties of various packaging raw materials as well as the final package. 4. Understand the principal methods of packaging foods as well as criteria for selecting and testing packaging materials. 5. Have familiarity with packaging equipment and methods. 6. Have discussed recent advances in food packaging techniques and systems. |
| Content | <ol style="list-style-type: none"> 1. Overview 2. Food deterioration, shelf-life and reaction kinetics 3. Paper and paperboard 4. Paperboard packaging 5. Glass containers 6. Metal cans and containers 7. Basic polymer chemistry 8. Shaping plastics 9. Plastic materials 10. Retortable plastic containers and aseptic packaging 11. Aluminum foils and metallizing 12. Flexible packaging 13. Effect of Physical Properties of Packaging 14. Distribution packaging 15. Permeation in packages 16. Modified atmosphere 17. Packaging for oxygen and moisture sensitive foods 18. Package design for safety and security 19. Active packaging 20. Intelligent packaging 21. Packaging as a waste material |
| Study and examination requirements and forms of examination | <ol style="list-style-type: none"> a. 25% First Exam b. 25% Second Exam c. 10 % Activities and quizzes d. 40% Final Exam |
| Media employed | PowerPoint slides, E-learning Moodle, lecture notes, and Teams or Zoom meetings. |
| Reading list | <ol style="list-style-type: none"> 1. Food Packaging, Principles and practice. 2nd Ed. Gordon L Robertson. Marcel Dekker, Inc., New York, NY. 2. Food Packaging and Technology. Richard Coles, Derek McDowell and Mark J Kirwan. Blackwell Publishing Ltd., Oxford, UK |

| Module designation | Community Nutrition | | |
|--|--|----------------------|----------------------|
| Module level, if applicable | Fourth Year | | |
| Code, if applicable | NF483 | | |
| Subtitle, if applicable | | | |
| Courses, if applicable | | | |
| Semester(s) in which the module is taught | First and second semester | | |
| Person responsible for the module | Dr Hadil S Subih | | |
| Lecturer | Dr Hadil S Subih | | |
| Language | English | | |
| Relation to curriculum | Elective course in the Fourth year | | |
| Type of teaching, contact hours | 3 Credit Hours Lecture: 3 lectures | | |
| Workload | | Contact Hours | Private Study |
| | Lectures | 35 | 55 |
| | Exercises | 10 | 26 |
| | Exams | 4 | 20 |
| | Total | 49 | 101 |
| | Total hours = 150 | | |
| Credit points | 5 ECTS | | |
| Requirements according to the examination regulations | None | | |
| Recommended prerequisites | NF 381 Or NF 382 | | |
| Module objectives/intended learning outcomes | <p>The aim of this course is to enable the students to identify the programs needed for target population in the community based on resources and needs assessment and understand the importance of behavior change theory.</p> <ol style="list-style-type: none"> 1. Identify characteristics that define the community nutritionists professional roles and responsibilities 2. Demonstrate knowledge and skills related to current and emerging public health nutrition and community nutrition | | |

| Module designation | Community Nutrition |
|--|---|
| | <ol style="list-style-type: none"> 3. Effectively assess a target population to determine their nutrition education needs 4. Implement and evaluate a nutrition education session/class 5. Complete a small grant application appropriate for meeting the needs of a target population 6. Describe the policy-making process and explain how laws and regulations are developed |
| Content | <ol style="list-style-type: none"> 1. Opportunities in community nutrition 2. Assessing community resources 3. Assessing nutritional status of a population 4. Program planning for success 5. Principles of epidemiology 6. The art & science of policy making 7. A national nutrition agenda for the public health 8. Addressing the obesity epidemic 9. Food Insecurity 10. World Hunger and food insecurity 11. Mothers and Infants 12. Children and adolescents 13. Healthy Aging 14. Understanding and achieving behavior change 15. Gaining cultural competence in community nutrition 16. Principles of nutrition education 17. Marketing nutrition and health promotion |
| Study and examination requirements and forms of examination | <ol style="list-style-type: none"> a. 30% First Exam b. 30% Second Exam c. 40% Final Exam |
| Media employed | PowerPoint slides, E-learning Moodle, lecture notes, blackboard, and others |
| Reading list | Marie A. Boyle David H. Holben. community nutrition in action 7th edition, 2016 |

| Module designation | Metabolic Nutrition | | |
|--|--|---------------|---------------|
| Module level, if applicable | Fourth Year | | |
| Code, if applicable | NF 487 | | |
| Subtitle, if applicable | | | |
| Courses, if applicable | | | |
| Semester(s) in which the module is taught | Second Semester | | |
| Person responsible for the module | Dr. Bayan Obeidat | | |
| Lecturer | Dr. Sana Janakat Dr. Bayan Obeidat Dr. Hana Alkhalidy | | |
| Language | English | | |
| Relation to curriculum | Elective course in the second semester of the fourth year | | |
| Type of teaching, contact hours | 3 Credit Hours Lecture: 3 lectures | | |
| Workload | | Contact Hours | Private Study |
| | Lectures | 45 | 81 |
| | Exams | 4 | 20 |
| | Total | 49 | 101 |
| | Total hours = 150 | | |
| Credit points | 5 ECTS | | |
| Requirements according to the examination regulations | None | | |
| Recommended prerequisites | NF 284 | | |
| Module objectives/intended learning outcomes | <ol style="list-style-type: none"> 1. Explain the metabolism and functions of macro-nutrients, carbohydrates, lipids and proteins, in relation to body health and human nutritional adaptive capabilities. 2. Compare and contrast metabolic fuel and processes during the fed, fasting and starvation states, and discuss alterations in the presence of inflammation or disease. | | |

| Module designation | Metabolic Nutrition |
|--|---|
| | <ol style="list-style-type: none"> 3. Explain the inflammatory process and the role of lipid metabolism in its modulation. 4. Summarize the current state of knowledge in the fields of nutrigenomics and nutrigenetics 5. Recognize the steps in the development of cardiovascular disease, diabetes mellitus, and obesity that are affected by nutrition |
| Content | <ul style="list-style-type: none"> • Introduction • Overview of Digestion, Absorption and Metabolism • Carbohydrates: structure, digestion, absorption, metabolism and disorders of metabolism. • Ethanol • Insulin, glucagon, and diabetes mellitus. • Dietary fiber. • Sugars and sweeteners. • Lipids: structure, digestion, absorption, metabolism. • Lipoproteins and Physiological Effects of the Mediterranean Diet • Lipids and Inflammation: Omega-6 and Omega-3 Fatty Acids • Body Composition and Measurement • Metabolic Effects of Overweight and Obesity • Proteins and amino acids: structure, digestion, absorption, metabolism • Special amino acids (branched-chain amino acids, glutamine, arginine) • Starvation and metabolic response to stress • Protein, carbohydrate, and sports nutrition • Nutrigenomic and Nutrigenetics |
| Study and examination requirements and forms of examination | <ol style="list-style-type: none"> a. 25% First Hour Exam b. 25% Second Hours Exam c. 10% Quizzes and Assignments d. 40% Final Exam |
| Media employed | PowerPoint slides, E-learning Moodle, and Zoom meetings. |
| Reading list | <ol style="list-style-type: none"> 1. Gropper, S. and Smith, J. (2013) Advanced Nutrition and Human Metabolism, 6th Edition. Wadsworth Cengage Learning, Australia. 2. Stipanuk and Caudill (2013) Biochemical, Physiological and Molecular Aspects of Human Nutrition. Third Edition. Saunders (Imprint) USA. |

| Module designation | Nutrition Through the Life Span | | |
|--|---|----------------------|----------------------|
| Module level, if applicable | Fourth Year | | |
| Code, if applicable | NF488 | | |
| Subtitle, if applicable | | | |
| Courses, if applicable | | | |
| Semester(s) in which the module is taught | First and second semesters | | |
| Person responsible for the module | Dr. Hana Alkhalidy | | |
| Lecturer | Dr. Hana Alkhalidy | | |
| Language | English | | |
| Relation to curriculum | Elective course in the first or second semester of the fourth year | | |
| Type of teaching, contact hours | 3 Credit Hours Lecture: 3 lectures | | |
| Workload | | Contact Hours | Private Study |
| | Lectures | 40 | 61 |
| | Exercises | 5 | 20 |
| | Exams | 4 | 20 |
| | Total | 49 | 101 |
| | Total hours = 150 | | |
| Credit points | 5 ECTS | | |
| Requirements according to the examination regulations | None | | |
| Recommended prerequisites | NF 381 Or NF 382 | | |
| Module objectives/intended learning outcomes | Objectives: <ol style="list-style-type: none"> 1. Recognize the human nutrient requirements during the primary stages of the life span. 2. Identify the physiological basis for nutritional requirements of women prior to conception, during pregnancy, and during lactation as related to optimal reproductive outcomes. | | |

| Module designation | Nutrition Through the Life Span |
|--|--|
| | <ol style="list-style-type: none"> 3. Learn the physiological and developmental changes and the nutritional requirements for normal growth and development of infants and children. 4. Describe general nutritional needs and special nutritional concerns of adolescents. 5. Identify the physiological basis for nutritional requirements of all adults related to health maintenance, disease prevention, and successful aging. <p>Learning outcomes:</p> <ol style="list-style-type: none"> 1. Be familiar with the primary stages in the life span and the physiological and developmental changes that occur during each stage. 2. Distinguish between the different nutritional requirements in each of the life stages. 3. Identify nutrition-related problems and medical conditions that may occur during life stages due to nutritional abnormalities. |
| Content | <ol style="list-style-type: none"> 1. Course Introduction 2. Review of Nutrition 3. Preconception Nutrition 4. Pregnancy Nutrition 5. Lactation Nutrition 6. Infant Nutrition 7. Toddler/Preschooler Nutrition 8. Child/Preadolescent Nutrition 9. Adolescent Nutrition 10. Nutrition for Adults 11. Nutrition and the Elderly |
| Study and examination requirements and forms of examination | <ol style="list-style-type: none"> a. 25% First Exam b. 25% Second Exam c. 10 % Activities and quizzes d. 40% Final Exam |
| Media employed | PowerPoint slides, E-learning Moodle, lecture notes, and Teams or Zoom meetings. |
| Reading list | Brown, J. (2014). Nutrition Through the Life Cycle. 5th edition. Cengage Learning. |

| Module designation | Special Topics (A) | | |
|--|---|----------------------|----------------------|
| Module level, if applicable | Fourth Year | | |
| Code, if applicable | NF 492 | | |
| Subtitle, if applicable | | | |
| Courses, if applicable | | | |
| Semester(s) in which the module is taught | First and second semesters | | |
| Person responsible for the module | Dr. Hana Alkhalidy | | |
| Lecturer | Dr. Hana Alkhalidy | | |
| Language | English | | |
| Relation to curriculum | Elective course in the first and second semester of the fourth year | | |
| Type of teaching, contact hours | 3 Credit Hours Lecture: 3 lectures | | |
| Workload | | Contact Hours | Private Study |
| | Lectures | 35 | 81 |
| | Exercises | 10 | 20 |
| | Exams | 4 | 20 |
| | Total | 49 | 101 |
| | Total hours = 150 | | |
| Credit points | 5 ECTS | | |
| Requirements according to the examination regulations | None | | |
| Recommended prerequisites | Completion of 90 CH | | |
| Module objectives/intended learning outcomes | Depending on the topic | | |
| Content | Lecture presentation of specialized material not available in formal courses of the department. The specific topic that is offered will be indicated on the student's record. | | |
| Study and examination requirements and forms of examination | a. 25% First Exam b. 25% Second Exam c. 10 % Project d. 40% Final Exam | | |
| Media employed | PowerPoint slides, E-learning Moodle, lecture notes, and Teams meetings. | | |
| Reading list | Depending on the topic | | |

| Module designation | Special Topics (B) | | |
|--|---|----------------------|----------------------|
| Module level, if applicable | Fourth Year | | |
| Code, if applicable | NF 492 | | |
| Subtitle, if applicable | | | |
| Courses, if applicable | | | |
| Semester(s) in which the module is taught | First and second semesters | | |
| Person responsible for the module | Dr. Hana Alkhalidy | | |
| Lecturer | Dr. Hana Alkhalidy | | |
| Language | English | | |
| Relation to curriculum | Elective course in the first and second semester of the fourth year | | |
| Type of teaching, contact hours | 2 Credit Hours Lecture: 2 lectures | | |
| Workload | | Contact Hours | Private Study |
| | Lectures | 26 | 31 |
| | Exercises | 9 | 10 |
| | Exams | 4 | 10 |
| | Total | 39 | 51 |
| | Total hours = 90 | | |
| Credit points | 3 ECTS | | |
| Requirements according to the examination regulations | None | | |
| Recommended prerequisites | Completion of 90 CH | | |
| Module objectives/intended learning outcomes | Depending on the topic | | |
| Content | Lecture presentation of specialized material not available in formal courses of the department. The specific topic that is offered will be indicated on the student's record. | | |
| Study and examination requirements and forms of examination | a. 25% First Exam b. 25% Second Exam c. 10 % Project d. 40% Final Exam | | |
| Media employed | PowerPoint slides, E-learning Moodle, lecture notes, and Teams meetings. | | |
| Reading list | Depending on the topic | | |

| Module designation | Special Topics (C) | | |
|--|---|----------------------|----------------------|
| Module level, if applicable | Fourth Year | | |
| Code, if applicable | NF 492 | | |
| Subtitle, if applicable | | | |
| Courses, if applicable | | | |
| Semester(s) in which the module is taught | First and second semesters | | |
| Person responsible for the module | Dr. Hana Alkhalidy | | |
| Lecturer | Dr. Hana Alkhalidy | | |
| Language | English | | |
| Relation to curriculum | Elective course in the first and second semester of the fourth year | | |
| Type of teaching, contact hours | 1 Credit Hours Lecture: 1 lecture | | |
| Workload | | Contact Hours | Private Study |
| | Lectures | 16 | 16 |
| | Exercises | 8 | 8 |
| | Exams | 4 | 8 |
| | Total | 28 | 32 |
| | Total hours = 60 | | |
| Credit points | 2 ECTS | | |
| Requirements according to the examination regulations | None | | |
| Recommended prerequisites | Completion of 90 CH | | |
| Module objectives/intended learning outcomes | Depending on the topic | | |
| Content | Lecture presentation of specialized material not available in formal courses of the department. The specific topic that is offered will be indicated on the student's record. | | |
| Study and examination requirements and forms of examination | a. 25% First Exam b. 25% Second Exam c. 10 % Project d. 40% Final Exam | | |
| Media employed | PowerPoint slides, E-learning Moodle, lecture notes, and Teams meetings. | | |
| Reading list | Depending on the topic | | |

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|--|--|----------------------|----------------------|
| Module designation | Scientific Research Methods | | |
| Module level, if applicable | Fourth Year | | |
| Code, if applicable | NF 494 | | |
| Subtitle, if applicable | | | |
| Courses, if applicable | | | |
| Semester(s) in which the module is taught | First and second semesters | | |
| Person responsible for the module | Dr. Hana Alkhalidy | | |
| Lecturer | Will be assigned | | |
| Language | English | | |
| Relation to curriculum | Elective course in the first or second semester of the fourth year | | |
| Type of teaching, contact hours | 3 Credit Hours Lecture: 3 lectures | | |
| Workload | | Contact Hours | Private Study |
| | Lectures | 30 | 30 |
| | Assignments and in-class activities | 15 | 21 |
| | Research Report | 1 | 30 |
| | Presentation | 3 | 20 |
| | Total | 49 | 101 |
| | Total hours = 150 | | |
| Credit points | 5 ECTS | | |
| Requirements according to the examination regulations | | | |
| Recommended prerequisites | Completion of 90 credit hours and NF299 pass | | |
| Module objectives/intended learning outcomes | Course Objectives: By the end of this course, students will be able to: <ol style="list-style-type: none"> 1. Understand the principles and methods of experimental design and research. 2. Demonstrate proficiency in formulating research questions and hypotheses. | | |

| | |
|---------------------------|---|
| Module designation | Scientific Research Methods |
| | <p>3. Plan and design experiments, surveys, and data collection methods.</p> <p>4. Acquire and analyze data.</p> <p>5. Interpret research findings and draw meaningful conclusions.</p> <p>6. Apply ethical considerations in research design and data collection.</p> <p>7. Effectively communicate research results through well-structured written reports and presentations.</p> <p>Course Learning Outcomes:</p> <p>Upon successful completion of the course, students will be able to:</p> <ol style="list-style-type: none"> 1. Demonstrate proficiency in experimental design principles and methodologies. 2. Plan and execute a well-designed research project. 3. Develop strong technical writing skills for the final report. 4. Present research results. |
| Content | <p><u>Course Topics:</u></p> <p>Introduction to Experimental Design (Week 1)</p> <ul style="list-style-type: none"> • Introduction to research methodologies and experimental design principles. • Formulating research questions and hypotheses. • Identifying variables and defining measurement scales. • Ethical considerations in research. <p>Research Planning and Data Collection (Weeks 2-3)</p> <ul style="list-style-type: none"> • Planning research projects and designing experiments. • Sampling techniques and sample size determination. • Developing surveys and questionnaires. • Data collection methods and tools. <p>Data Analysis and Interpretation (Weeks 4-6)</p> <ul style="list-style-type: none"> • Introduction to statistical analysis techniques. • Data cleaning and preparation. • Descriptive statistics and data visualization. • Inferential statistics: t-tests, ANOVA, regression analysis. • Interpreting research findings and drawing conclusions. <p>Reporting and Presentation of Results (Weeks 7-8)</p> <ul style="list-style-type: none"> • Writing the final research report: structure and organization. • Effective data visualization and graphical representation. • Presenting research findings in a clear and concise manner. <p>Ethical Considerations in Research (Week 9)</p> <ul style="list-style-type: none"> • Understanding and applying ethical guidelines in research. • Informed consent and protection of participants' rights. • Confidentiality and data protection. • Research integrity and avoiding plagiarism. <p>Project Work and Final Report (Weeks 10-15)</p> |

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|--|---|
| Module designation | Scientific Research Methods |
| | <ul style="list-style-type: none"> • Students will work on their research under the guidance of the instructor. • Writing the final research report. • Submission and presentation of the final research report. |
| Study and examination requirements and forms of examination | <p>Evaluation of student progress will be based on:</p> <ol style="list-style-type: none"> a. Students will complete a series of written assignments and exercises 20% b. Active participation in discussions, and group activities will be assessed 10% c. Students will work on writing a research proposal 20% d. Students will work on completing their research and writing a final research report 20% e. Students will deliver scientific presentations of their research 30% |
| Media employed | PowerPoint slides, E-learning Moodle, lecture notes, and Microsoft Teams and/or Zoom meetings. |
| Reading list | <ul style="list-style-type: none"> - Mishra, S. B., & Alok, S. (2022). Handbook of research methodology. - Rhonda Liss and Jason Davis. (2012). Effective Academic Writing Second Edition. Oxford University Press; Revised ed. Edition - Research articles |