

# TEACHERS' GUIDE FOODI



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## D2.6 TEACHERS' GUIDE FOODI

WP2. Capacity-building and Curricula development

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## **1 Introduction**

### **1.1 Vision and Values**

Graduates of the FOODI MSc) Programme in Food Processing and Innovation demonstrate advanced knowledge and skills in the interdisciplinary field of food science and technology and possess a strong technical capability enabling them to contribute to the transformation of the food industry through a creative, innovative and professional approach.

The programme exposes students to a range of core and elective courses enabling them to critically analyse, synthesize, evaluate and interpret information pertaining to the food business sector, to develop a creative and innovative mindset and to act and communicate in a professional and ethical manner, ultimately leading developments and resolving challenges in the food sector.

The learning takes place in a transnational, diverse, adaptive and innovative blended learning environment using a variety of methodologies and tools including traditional classroom lectures, laboratory work, field trips, case studies and simulations, team-based learning and project work, self-directed and autonomous learning, workshops, seminars, professional industry internships as well as webinars and on-line tutorials. It engages with the FOODI Centres of Excellence for vocational training courses and with digital learning (MOOCs).

Key enablers of student learning are academia-industry collaboration, diverse learning, critical thinking, projects, presentations, design thinking and prototype development, teamwork, collaboration, discourse and debate, group-based project learning, assignments, mentorship, case studies aligned to regional challenges but with a national and international context.

### **1.2 Programme Outcomes**

Graduates of the programme can:

- Integrate knowledge of food science/technology/entrepreneurship principles for transformation of the food industry to produce quality, safe, sustainable, healthy food.
- Critically evaluate and apply innovative technologies for positive disruption and development of the food industry.
- Conduct research and adhere to legal, ethical and professional practices in food innovation.
- Demonstrate the ability to perform and effectively communicate original research in interdisciplinary areas of food science, technology and entrepreneurship.
- Implement standard analytical and innovative methods including digital technologies, statistical software to monitor the risks and hazards influencing food quality.
- Demonstrate responsibility in planning, resource management, supervision, problem solving and managing work within a team and collaboratively with other teams.
- Analyse the main economic and strategic issues concerning food markets and consumer preferences, creating effective marketing plans for the food industry
- Plan or lead an entrepreneurial venture/ “start-up” or apply intrapreneurial intervention in the food domain.

### **1.3 Programme Philosophy**

The core philosophy of the programme is to inculcate students with an innovative, creative mindset, with attendant knowledge, skills, perspectives and cognitive abilities to foster such a mindset, and to imbue them with an enthusiasm for innovation, critical thinking and lifelong learning. This philosophy will revolve around a pedagogical approach rooted in active learning, associated methodologies and innovation in content and approach, that encapsulates a challenging, innovative and creative environment and commensurate activities for learners, while addressing the needs of the regional food industry.

### **1.4 Rationale**

Modern societies and economies are increasingly complex and interconnected and the environment in which students will find themselves has been described as volatile, uncertain, complex and ambiguous (VUCA) 1,2. Copious information is available to a greater depth and extent than at any time in history and this proves extremely challenging in formulating and implementing business and technical plans and decisions in most industries. Sustainability of social, economic and ecological dimensions of societies is becoming acutely important and demands creativity in responding to emergent challenges in every sphere of activity. Within this context, students need to be lifelong, adaptive and active learners who can engage with and are invested in diverse and trans-disciplinary expertise which can impact positively upon their daily professional lives as well as those of citizens, customers and clients. Enhanced cognitive facility and critical thinking will be more important in the emerging VUCA environment. An ability to critically analyse, synthesise, evaluate and interpret data so that useful and usable information can be discerned and disseminated will become increasingly important in an era of likely decreasing marginal utility, especially in resource-based industries such as food processing. Hence, in the educational environment, that students will merely be passive recipients of information is not now regarded as best practice, in comparison with the contemporary ideal centred on so-called pedagogies of engagement 3 including active learning, communities of learning (in addition to self-directed and autonomous learning) and, specifically, cooperative and problem-based learning. In this regard, students engaged in the FOODI Masters Programme in Food Processing and Innovation will be exposed to a variety of teaching tools and styles, revolving around such pedagogies of engagement. Formative assessments for learning will be deployed, feedback will be educative as well as auditive and environments where a participative and collaborative approach is advocated and further, actively encouraged and facilitated, both between learners and between learners and teachers will also be deployed.

### **1.5 Programme design**

The programme is designed to facilitate significant learning and in this regard an approach based on integrated course design is espoused, as elaborated by Fink <sup>4</sup>. Fink provided a combination of conceptual and procedural tools, formulated into a taxonomy of significant learning, systematically combining learning-centred teaching based on evidence with a formal teaching strategy. Fink espoused an approach to course design which emphasizes integration of three fundamental elements – learning goals, feedback and assessment and teaching and learning activities. In designing a course, these three elements must be jointly considered. This process begins with consideration of situational factors or context, then elucidates learning goals, maps these to feedback and assessment strategies by ‘backward design’ and formulates appropriate and necessary teaching and learning activities. Integration ensures that the three components are in alignment and support each other, whereby, for example, if critical thinking is cited as a learning goal, that the feedback



and assessment fosters this, and that the teaching and learning in class imbue this cognitive skill in learners. Learning goals should be formulated around significant learning, where learners are engaged in active and experiential learning by 'doing', 'thinking about doing' and 'thinking about having done', rather than merely being passive recipients of information and ideas. 'Thinking about having done' connotes reflection upon information, ideas and experience, where the learner had adopted the role of active participant or observer. This approach was taken in designing the FOODI curriculum.

## **1.6 Methodologies and Tools**

Teaching and learning methodologies and tools are a particularly important aspect in any course design and in course delivery. The emphasis in the FOODI MSc Programme, from its inception, was to imbue an innovative philosophy, both in content and pedagogy. As such, a variety of methodologies and tools are used in the programme, in a departure from more traditional and didactic delivery modes wholly reliant on the lecture. These innovative methodologies and tools are intended to expose learners to an environment conducive to significant learning and so-called rich learning experiences. Necessarily, this involves learners being actively engaged in a wider range of activities such as those outlined below. These activities can also serve a purpose in a broader strategy geared towards assessment for learning. This type of assessment is viewed by the educational practitioner as an opportunity to provide feedback to learners with a formative and educative purpose. The educator can incorporate exercises, questions and/or problems that attempt to simulate 'real world' issues, problems or challenges, as described by Fink<sup>4</sup>.

### **1.7 Assignment**

"An assignment is a teaching method that aims to have students independently acquire academic competences; this can be both in an individual or group context. No contact hours are offered for completion of the assignment, the students have to carry out the task in their own time. This concerns the student(s) to work independently, supervised by the teacher. The separate category 'assignment' is only used when it concerns an assignment exclusively." <sup>5</sup> Assignments can be conducted on an individual or group basis, and can be formative in nature, as well as summative. Assignments can embrace scope so that apart from more traditional assignments, they can also include business cases and case studies, detailed below.

### **1.8 Business Case**

A business case captures the reasoning and justification for initiating a project and follows a systematic framework in a series of steps that include confirming an opportunity, analysing and developing shortlisted options, evaluation of those options, implementation of a strategy and choosing a recommended option. The business case can take the form of a report and/or a presentation and is a holistic teaching and learning tool in as much as it demands analysis and evaluation of all aspects, including technical, scientific, business and financial, of an opportunity, likely in response to a problem<sup>5</sup>.

### **1.9 Case Study**

Many students are more inductive than deductive reasoners. This means that they learn better from practical, real world examples than from logical development starting with foundational principles<sup>6</sup>. The use of case studies can therefore be a very effective classroom technique. Case studies are particularly appropriate and useful when teachers want students to explore how what they have learned applies to real world

situations. Use of case studies is a form of active, problem-based learning. Case studies are narratives that contain information and invite analysis<sup>7</sup>. They present situations, select data samplings, or statements that present unresolved and provocative issues, situations, or questions<sup>8</sup>. Despite elaborating a coherent narrative, analysis is generally not provided<sup>7</sup>, except in such cases where resolutions to problems based on critical analysis may have been conducted. Alternative unresolved cases may be open-ended. Such open-ended cases can involve situations in which decisions must be made or problems resolved, or they can involve evaluation or reconsideration of existing policies, practices or proposals. The case study is a participatory, discussion-based way of learning where students gain skills in critical thinking, communication, and group dynamics<sup>8</sup>. To analyse case studies, students are forced to master material. Critical analysis and evaluation of a case study trains students in critical evaluation and in making decisions and defending them to a group, focuses on practical examples, allows them to share their own work experience and ensures retention of lessons learned. Case assignments can be done individually or in teams of varying sizes, or on a whole class basis so that the students can brainstorm solutions and share the work load. A major advantage of teaching with case studies is that the students are actively engaged in elucidating the principles by abstracting from the examples provided. This develops their skills in <sup>6</sup>:

- Problem solving
- Analytical tools, quantitative and/or qualitative, depending on the case
- Decision making in complex situations
- Coping with ambiguities
- Group-based dynamics and learning

The presentation of a case study establishes a framework for analysis <sup>6-8</sup>. It is helpful if the statement of the case provides enough information for the students to figure out solutions and then to identify how to apply those solutions in other similar situations. Teachers may choose to use several cases so that students can identify both the similarities and differences among the cases and facilitate comparative evaluations.

Depending on the course objectives, the instructor may encourage students to follow a systematic approach to their analysis. For example:

- What is the issue?
- What is the goal of the analysis?
- What is the context of the problem?
- What key facts should be considered?
- What alternatives are available to the decision-maker?
- What would you recommend - and why?" <sup>6</sup>
- What could be the contingency plans?

Unlike problem sets, case studies do not break the problem down into clear steps, and frequently have no single "right" answer. Case studies provide a rich contextual way to introduce new material and create opportunities for students to apply the material they have just learned. The same overarching case can even be used several times in the same course, as students return to the story of the case with new analytical techniques and tools. Cases require students to make choices about what theory or concepts to apply in conducting the analysis, which is distinct from the one to one correspondence between theory and application that they see in their textbooks or hear in lectures."<sup>7</sup>

In classroom discussion, students analyse the information in the case and use it to solve the problem set up by the case. The discussion can take many forms, including closely directed questioning by the teacher, acting as facilitator, to help students draw out the information from the case and identify the central decisions or evaluations that need to be made, more open-ended questions and discussions as students evaluate options and weigh the evidence, and small group work by students focused on specific analytical tasks.”<sup>7</sup>

Role-play can be utilised as an effective technique to immerse students in the case environment and its context. Ideally, case method discussions of case studies should involve mostly conversation between and among students, rather than discussion centred on direct participation by the teacher in the discussion. Rather, in such situations, the teacher leading the case method acts as conductor, facilitator, or guide, leveraging their role in facilitating the discussion in which students are the primary participants.<sup>7</sup>

### **1.10 Critical Analysis**

Critical analysis aspires to reach beyond mere descriptive analysis of an observation or problem to be solved which involves asking the analytical questions involving the ‘what’, ‘when’, ‘who’, ‘where’, ‘why’ and ‘how’ but progressing beyond these formulations to invoking the ‘what if’, ‘so what’ and ‘what next’.<sup>9</sup> A critical analysis extends an analysis of a problem or situation based on an interpretation of a set of observations to propose alternative courses of action and potential solutions as well as comparative evaluations of proposed alternatives. Critical analysis connotes the cognitive ability for critical thinking, which stated simply is the ability to analyse and evaluate information, to identify and raise important problems and questions, formulate them clearly, gather and assess relevant information, utilise abstract ideas, metaphor and analogy, think open-mindedly and communicate derived conclusions and their generation effectively<sup>10-12</sup>.

### **1.11 Critical Reflection (Reflective Practice)**

The purpose of critical reflection or reflective practice is to develop and enhance self-awareness and critical thinking skills. The practice can also be engaged in by teachers and has many benefits including increased confidence among teachers, as well as encouraging innovation and engagement so that the classroom environment and experience is mutually beneficial for students and teachers.<sup>13</sup> Critical thinking skills embody the capacity to be deliberate about thinking and to use advanced cognitive skills, and to question inferences, assumptions and implications of observations and actions and of practices, processes and policies. “Critical thinking is that mode of thinking - about any subject, content, or problem - in which the thinker improves the quality of his or her thinking by skillfully analysing, assessing, and reconstructing it. Critical thinking is self-directed, self-disciplined, self-monitored, and self-corrective thinking.”<sup>14</sup> As such, critical thinking as a skill, and as a way of thinking, of being, and of viewing the world, is autonomous in operation but also contingent on experiences of the individual with the group and group experiences. It allows space for self-evaluation and appraisal of personal strengths and weaknesses, awareness of which may be critical for the empathy phase in action research or design thinking approaches embedded in the innovative mindset. It depends on a continuous cycle self-observation, self-evaluation and refinement of practice. It “presupposes assent to rigorous standards of excellence and mindful command of their use. It entails effective communication and problem-solving abilities, as well as a commitment to overcome our native egocentrism and sociocentrism.”<sup>14</sup> Critical thinking connotes an attempt at objective judgements grounded in logical thought and reasoning aimed at identifying merits and faults, advantages and disadvantages in arguments, while avoiding subjective biases and prejudices.

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### Principles of Critical Thinking<sup>15</sup>:

- Gather complete information.
- Understand and define all terms
- Question the methods by which facts are derived.
- Question the conclusions.
- Look for hidden assumptions and biases.
- Question the source of facts.
- Do not expect all the answers.
- Examine the complete or meta-data, i.e. consider the big picture.
- Examine multiple cause and effect.
- Watch for thought stoppers.
- Understand your own biases and values.

As part of a critical reflection framework, journal keeping should be encouraged and facilitated as part of the continuous cycle of self-observation, self-evaluation and refinement of practice. Journals, logs, diaries and portfolios are containers for writing that has occurred over a period of time. Generally speaking, keeping journals can facilitate critical reflection, which is especially useful in helping learners to integrate learnings from different courses.<sup>16</sup> The “reflective practitioner” is also more engaged, more self-aware, and is aware that “learning to learn” is crucial in a VUCA environment <sup>1,2</sup>, and is more likely to engage in self-directed, autonomous, lifelong learning.<sup>17</sup>

### **1.12 Data Analysis**

Data is raw, unorganized facts that need to be processed. Data can be something simple and seemingly random and useless until it is organized. When data is processed, organized, structured or presented in a given context so as to make it useful, it is called information. Thus, data analysis requires students to organise, analyse and to synthesise, as opposed to compartmentalize. Making connections between seemingly disparate data will become an increasingly important competence.

Data analysis is a broad and inter-disciplinary field of study since different forms, types and complexities of data are increasingly likely to be encountered by professionals. Interpretation of data sets and the agility to generate meaningful insights and formulate decisions based on these present opportunities for collaborative, group- and problem-based learning. Data analysis can also be extended beyond the traditional classroom and facilitates group-based activities including debates, tutorials, seminars and workshops.

### **1.13 Dissertation/Thesis**

Both dissertations and reports are written works submitted for assessment by students. The main difference between a report and a dissertation is that a report is often written in response to a set brief which has already been defined for the student, whereas a dissertation is an independent research project. In the case of a dissertation, the student is afforded increased freedom to design their task and set their own question(s) to research<sup>18</sup>.

### **1.14 Laboratory**

Laboratory classes enable students to acquire a range of practical skills and can extend and complement knowledge gained in classroom environments. Laboratory classes also facilitate active learning as elaborated by Fink<sup>4</sup> as students can both observe instructors, each other and actively participate. Therefore, laboratory classes are a core component of an active learning environment.

### 1.15 Lecture

A lecture is a teaching method in which the teacher offers instruction to the entire group of students that enrolled for the course. Lectures can be interactive to a greater or lesser extent; the teacher remains the most important actor. However, in an active learning environment, lecturers are expected to be more dynamic and more engaged with students. The key is for the lecturer to establish a connection and rapport with the audience. Given that the emphasis on and ethos of innovation within the Masters Programme is the core tenet, the traditional didactic and passive lecture format, with teacher as 'sage on the stage', should be adapted towards a more participative approach with the teacher more often fulfilling the role of the 'guide on the side'. Although the lecturer still plays a pivotal role, students engaged in active learning with a view towards achieving significant learning should be facilitated to play a more participative role. Structured questioning is to be encouraged. The flipped classroom approach can facilitate this endeavour<sup>19</sup>. In the flipped classroom model, content is delivered to learners prior to class engagement of teachers and learners, and in class learners are encouraged to interrogate content with the teacher acting as a facilitator. Taking of subjective notes can be encouraged but this can be supplemented and augmented by practices such as keeping a reflective journal, which can also serve as an educative assessment tool. Three core tenets of the lecture are as follows<sup>20</sup>:

- Connecting with the audience
- Delivery
- Non-verbal cues
  
- Connecting with the audience
  - Ensure opening captures the audience's interest and attention
  - Engage students
  - Phrase and pause [Speak deliberately, construct your dialogue and allow time for the audience to digest the content and appreciate its flow]
  - Talk to individuals
  - Get agreement [Look to the audience for 'silent cues' to ensure they are following your dialogue]
  - Provide activities
  - Encourage students to ask questions
  - Use students' names as often as possible
  
- Delivery
  - Speak clearly
  - Don't rush or talk deliberately slowly

- Use deliberate pauses at key points
  - Change the tone of delivery
  - Use hand movements to emphasise points
  - Exhibit enthusiasm about the topic
  - Project your voice or use a microphone if necessary
  - Use a variety of media; use of electronic media is not always recommended
- 
- Non-verbal cues
    - Establish eye contact
    - Smile, be calm and be engaging
    - Move around and interact rather than simply reading from notes
    - Be confident in your delivery and interaction
    - Respond to students' reactions, and adjust and adapt accordingly
    - Keep an eye on the audience's body language

### **1.16 Literature Review**

A literature review is a search and evaluation of the available literature in a given subject or chosen topic area. It documents the state of the art with respect to the subject or topic written about.

A literature review has four main objectives. These are as follows<sup>21</sup>:

- To survey the literature in your chosen area of study
- To synthesise the information in that literature into a summary
- To critically analyse the information gathered by identifying gaps in current knowledge; by showing limitations of theories and points of view; and by formulating areas for further research and reviewing areas of controversy
- To presents the literature in an organised way

A literature review shows the reader that the student has an in-depth grasp of the chosen subject and that they understand where their own research fits into and adds to an existing body of agreed knowledge. It also does the following:

- demonstrates a familiarity with a body of knowledge and establishes the credibility of the student's work;
- summarises prior research and says how current work is related to it;
- integrates and summarises what is known about a subject;
- demonstrates that the student has learned from others and that their research is a starting point for new ideas.”<sup>21</sup>
- Is a critical and in-depth evaluation, and is not an inventory of all previous research in a field but an assessment of previous research or writings that should also identify shortcomings and gaps in knowledge<sup>22</sup>

### **1.17 Seminars, Tutorials and Workshops**

A seminar is a group meeting (either face-to-face or online) where a number of students participate at least as actively as the teacher, although the teacher may be responsible for the design of the group experience, such as choosing topics and assigning tasks to individual students.”<sup>23</sup> A seminar is an example of a group-based teaching-learning session where discussion is usually facilitated by an expert in the chosen topic. These formats can also be delivered on a face-to-face basis or, alternatively, by utilizing distance learning and online platforms.

A tutorial is either a one-on-one session between a teacher and a student, or a very small group (three or four) of students and an instructor, where the learners are at least as active in discussion and presentation of ideas as the teacher.”<sup>23</sup>

Seminars, tutorials and workshops all speak to an active learning ethos and all are variants of small group learning environments where active interaction refines thinking, reflects attitude, and revolutionizes the problem-solving mindset. Although both sound pedagogic principles and available evidence support the use of interactive teaching and learning approaches, the format is often variable and the terms small-group teaching, tutorial, seminar, group discussion, problem-based-learning group and workshop are used indiscriminately. In common, such formats imply the engagement of students interacting among themselves and with the teacher, and regardless of the format taken, sessions most often take place in small groups or, if in a large group, the group is divided into smaller subgroups. Such typically small group-learning environments are also conducive to problem-based learning where flipped learning can also be incorporated so that all of these formats facilitate use of cutting-edge tools and techniques where creativity and innovation in teaching and learning can be fostered.

Tutorials in particular are written to address student misconceptions<sup>24</sup> and to address topics that are particularly challenging to students and so they “scaffold student learning”<sup>24</sup>. “The first basic, though conceptually challenging, questions are designed to introduce the students to the topic and help them think about what they do and do not know. The tutorial then guides the students by asking questions focusing on underdeveloped or misunderstood concepts and slowly steps them through thinking about more difficult questions, helping the students construct a new understanding. The final questions on the tutorial tend to be higher level questions, both scientifically and cognitively, that indicate whether or not the students understand the material”<sup>24</sup>. Peer learning<sup>25</sup> and problem-based learning<sup>26</sup> are also facilitated.

Workshops with well-defined learning outcomes, utilising principles of experiential learning fit well with current trends in education, aligning well with interactive teaching principles. They can be a powerful and effective medium for teaching and potentiating a deeper level of learning. With appropriate pre-planning and design, they are a time-efficient way of meeting desired learning outcomes. They facilitate brainstorming and building relationships by providing learners with invaluable structured face-to-face contact. They can be delivered in a consistent fashion by different facilitators at a single teaching site or at multi-site teaching centres. They can help remove any ambiguity about individual tutors’ approaches to the use of face-to-face time and cater to different facilitation styles.

Seminars, tutorials and workshops also offer opportunities for students to engage in deeper, meaningful, active, group-based, and problem-based learning. Students who adopt a deep approach to learning tend to have a prior intrinsic interest in the subject. Their motivation is to learn because they want to know more about a topic. In contrast, students with a superficial approach to learning are more instrumental. Their interest is primarily driven by the need to get a pass grade or qualification.



Deeper approaches to learning, or meaningful learning, are found when there is a focus on analytical or critical thinking or problem-solving and in-class discussion, as well as post-session reflection, which can be facilitated by seminars, tutorials and workshops. In addition, assessment based on analysis, synthesis, comparison and evaluation is facilitated.<sup>27-29</sup>

### **1.18 Field Trips**

An excursion or field trip is a teaching method in which students (on the basis of information structured in advance) are confronted in the field with one or more concrete applications or phenomena; the students discuss the observations and findings with the teacher/ teaching staff.

### **1.19 Assessment**

Over the past two decades, the role of assessment in education has acquired a new significance. This newfound focus on assessment is emblematic of a learning culture. Formerly the term ‘assessment’ was primarily used to describe a process to gauge the effectiveness of some series of instructional activities after those activities had been completed or to satisfy the accountability demands of an external authority<sup>30, 31</sup>. Moreover, in traditional didactic teaching environments, learners could become disengaged from the learning process once their work was submitted<sup>32</sup>. In much the same way as learners in more traditional environments become passive recipients of information, they can also become passive recipients of assessment outcomes<sup>32</sup>. No information is provided to them that could inform them of scope for improvement or enable them to make sophisticated judgements about their own learning<sup>32</sup>. Additionally, this perspective on assessment is limited, and regards it merely as auditive and summative. Such a perspective is consonant with more conservative views on pedagogy which do not consider assessments as learning opportunities. In the holistic view of active learning espoused by Fink<sup>4</sup>, information and ideas are necessary for learners to experience rich learning environments where in addition to listening and note taking, they can engage more fully by doing, observing and reflecting on what they have done and what they have observed, or in other words, not alone doing and observing but also “thinking about doing/having done” and “thinking about observing/having observed”. The effectiveness of active learning is contingent on stimulation and communication of ideas and information; formative, educative assessment is one avenue to channel ideas and information<sup>4</sup>. As elaborated by Fink<sup>4</sup>, educative assessment should also be forward-looking and incorporate exercises, questions, and/or problems derived from, and applicable to future real-world scenarios and contexts. The assessment methodologies and tools deployed in FOODI, including the construction of portfolios of learner’s coursework, design-based projects and debates will offer enhanced opportunities to both teachers and learners to engage in assessment activities to achieve more innovative pedagogical approaches and better learning outcomes. Moreover, deployment of instructional contexts such as seminars, tutorials and workshops, which are more open and discursive, will provide opportunities for learner engagement consistent with active and significant learning but also for teachers to deploy educative “in class” assessment techniques in an innovative manner. Thus, cooperative, group and peer assessment<sup>33</sup> will be facilitated throughout the FOODI MSc Programme.



## 2 Details of the core and elective courses in the FOODI MSc Programme.

| Code   | Title   | Credits | Semester | Page number |
|--|---|---------|----------|-------------|
| Pre-requisite                                | Food Science & Technology (non-credit bearing)                    | -       | Pre-     |             |
| <b>FOODI Core Courses</b>                    |   |         |          |             |
| Core 1                                       | Research & Investigative Processes                                | 6       | 1        | 34          |
| Core 2                                       | Food Quality & Sensory Analysis                                   | 6       | 1        | 40          |
| Core 3                                       | Food Process Design   | 6       | 1        | 48          |
| Core 4                                       | Processing Effects on Structural & Functional Components of Foods | 6       | 1        | 54          |
| Core 5                                       | Business Strategy & Policy  | 6       | 1        | 62          |
| Core 6                                       | Food Safety, Law & Regulation                                     | 6       | 2        | 69          |
| Core 7                                       | Food Supply Chain, Traceability & Sustainability                  | 6       | 2        | 75          |
| Core 8                                       | Mastering Innovative & Disruptive Approaches for Success (MIDAS)  | 30      | 1, 2, 3  | 82          |
| Total Core Course Credits                    |   | 72      |          |             |
| <b>FOODI Elective Courses (any 3 chosen)</b> |   |         |          |             |
| 1  | Elective<br>Food Packaging  | 6       | 2 or 3   | 101         |
| 2  | Elective<br>Halal Regulation & Certification                      | 6       | 2 or 3   | 109         |
| 3  | Elective<br>Strategic Food Marketing                              | 6       | 2 or 3   | 116         |
| 4  | Elective<br>Nutrition & Health                                    | 6       | 2 or 3   | 124         |
| 5  | Elective<br>Entrepreneurship                                      | 6       | 2 or 3   | 133         |

|                                   |          |                    |    |        |     |
|-----------------------------------|----------|--------------------|----|--------|-----|
| 6                                 | Elective | Consumer Behaviour | 6  | 2 or 3 | 140 |
| Total Elective Course Credits     |          |                    | 18 | 2 or 3 |     |
| Total FOODI MSc Programme Credits |          |                    | 90 |        |     |

Table 1MSC FOODI Programme structure

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### **Additional Useful Information Consulted**

UCD Teaching & Learning,

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<https://www.ucd.ie/teaching/resources/teachingtoolkit/>

<http://www.ucd.ie/t4cms/tleffectivefeedback.pdf>

University College Dublin, Teaching & Learning Resources: Reflective Practice Models.

Some useful references and resources

Universal Design Principles

Burgstahler, S (2018) Universal Design of Instruction (UDI): Definition, Principles, Guidelines, and Examples, University of Washington. CAST (2018). Universal Design for Learning Guidelines version 2.2. Retrieved from <http://udlguidelines.cast.org> UDLL (2016). A Universal Design for Learning: A Best Practice Guideline. UDLL Partnership: HOWEST (SIHO), AHEAD and NTNU (Universell).

General Assessment and Feedback Principles

National Forum (2017). Principles of Assessment OF/FOR/AS Learning: National Forum Enhancement Theme. Dublin: Author

UCD Teaching & Learning (2018). UCD Programme Assessment and Feedback Principles. Dublin, UCD Teaching & Learning

### **Peer-reviewed academic literature**

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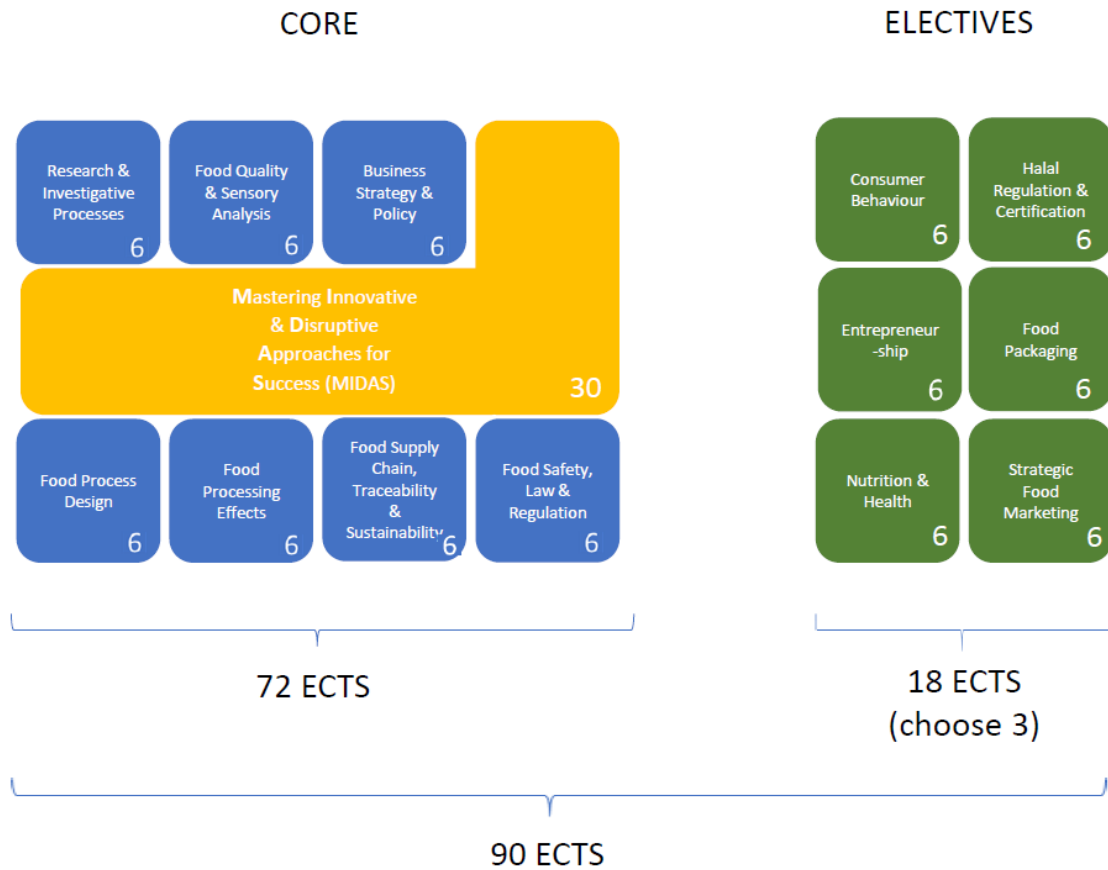


Figure 1 The structure of the FOODI MSc Programme. Each box represents 6 ECTS. The core courses contain 72 ECTS while the elective courses contain 18 ECTS, with students selecting any 3 of the 6 elective course options available. Of the 90 ECTS contained in the programme, the major individual component, at 30 ECTS, and unique to the FOODI MSc Programme, is the core course involving Mastering Innovative & Disruptive Approaches to Success, given the acronym MIDAS



Figure 2 The allocation of courses and associated credits (ECTS) to the FOODI MSc Programme, illustrating the prominent role played by the MIDAS course.

### 3 FOODI Core Courses - Course Descriptors

#### 3.1 FOODI Pre-requisite course – Food Science & Technology

|                     |  |        |   |             |
|---------------------|--|--------|---|-------------|
| Programme Title     | FOODI MSc in Food Processing and Innovation                                |        |   |             |
| Course Title:       | Food Science & Technology  |        |   |             |
| Course Code:        | FOODI Pre-requisite Course   |        |   |             |
| Course Type:        | Core <input type="checkbox"/> Elective <input checked="" type="checkbox"/> |        |   |             |
| Course Coordinator: | Mohd Isa (UiTM), PSU   |        |   |             |
| Credits:            | ECTS 2   | Level: | 9 | Semester: 1 |

#### A. Course Description

This course provides an introduction to food science and technology. It provides students with a general introduction to the food components and nutrients, food microbiology, preservation and processing of food commodities, food quality and safety, legislation and regulation.

#### B. Course Learning Outcomes. On completion the student will be able to:

Describe food components and their role in food.

Differentiate food quality attributes and apply appropriate evaluation methods.

Classify microbes in food.

Describe and apply the principles of food preservation and processing.

Classify hazards in food.

#### Transferable Skills

Knowledge, communication (verbal and non-verbal)

#### C. Assessment Strategies:

| Assessment Type | Percentage of Final Marks |
|-----------------|---------------------------|
|                 |                           |

|                                     |                            |    |
|-------------------------------------|----------------------------|----|
| <input checked="" type="checkbox"/> | Final Exam (FEX)           | 30 |
| <input checked="" type="checkbox"/> | Progress Test (PT)         | 10 |
| <input checked="" type="checkbox"/> | Presentation (PRS)         | 20 |
| <input type="checkbox"/>            | Portfolio (PTO)            | 0  |
| <input type="checkbox"/>            | Multiple Choice Exam (MCQ) | 0  |
| <input checked="" type="checkbox"/> | Assignment (ASM)           | 40 |
| <input type="checkbox"/>            | Design Project (DPR)       | 0  |
| <input type="checkbox"/>            | Debate (DEB)               | 0  |

| D. Indicative Student Workload:                  | Indicative hours      |
|--|-----------------------|
| Class Contact: Lectures                          | 2 hrs x 14 weeks = 28 |
| Class Contact: Small group discussions or online | 0                     |
| Class Contact: Workshops                         | 0                     |
| Specified learning activities                    | 0                     |
| Blended learning activities                      | 8                     |
| Autonomous student learning                      | 0                     |
| Group-based learning                             | 0                     |
| Assignment                                       | 15                    |
| Assessment (self-learning)                       | 12                    |
| Report   | 12                    |
| Presentation                                     | 8                     |
| Total hours                                      | 83                    |

| E. Teaching & Learning Methodologies & Tools        |                                     |   |
|---|-------------------------------------|---|
| Face-to-face <input type="checkbox"/>               | Online <input type="checkbox"/>     | Blended <input checked="" type="checkbox"/> |
|   | Individual                          | Group                                       |
| <input checked="" type="checkbox"/> Assignment (AS) | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/>         |



## Deliverable 2.4 Description of Methodology and Tools

|  |                                     |                                     |
|--|-------------------------------------|-------------------------------------|
| <input type="checkbox"/> Business Case (BC)                  | <input type="checkbox"/>            | <input type="checkbox"/>            |
| <input checked="" type="checkbox"/> Case Study (CS)          | <input checked="" type="checkbox"/> | <input type="checkbox"/>            |
| <input type="checkbox"/> Critical Analysis (CN)              | <input type="checkbox"/>            | <input type="checkbox"/>            |
| <input type="checkbox"/> Critical Reflection (CR)            | <input type="checkbox"/>            | <input type="checkbox"/>            |
| <input type="checkbox"/> Data Analysis (DA)                  | <input type="checkbox"/>            | <input type="checkbox"/>            |
| <input checked="" type="checkbox"/> Dissertation/Report (DR) | <input checked="" type="checkbox"/> | <input type="checkbox"/>            |
| <input type="checkbox"/> Laboratory (LB)                     | <input type="checkbox"/>            | <input type="checkbox"/>            |
| <input checked="" type="checkbox"/> Lecture (LE)             | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
| <input checked="" type="checkbox"/> Literature Review (LR)   | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| <input checked="" type="checkbox"/> Seminar (SR)             | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
| <input type="checkbox"/> Tutorial (TU)                       | <input type="checkbox"/>            | <input type="checkbox"/>            |
| <input type="checkbox"/> Workshop (WK)                       | <input type="checkbox"/>            | <input type="checkbox"/>            |
| <input type="checkbox"/> Field Trip (FT)                     | <input type="checkbox"/>            | <input type="checkbox"/>            |

| F. Alignment of Course Learning Outcome with Teaching & Learning Methodologies & Tools, Feedback & Assessment Strategies and Programme Outcomes |   |   |                          |  |
|---|---|---|--------------------------|--|
| No.   | Course Learning Outcome   | Teaching and Learning Methodology and Tools | Feedback & Assessment    | Programme Outcome (# 1 – 8) (see attached)   |
| 1.  | Describe food components and their role in food                                 | <i>Lecture</i>                              | Presentation, Final Exam | PO1: Integrate knowledge of food science/technology/entrepreneurship principles for transformation for food industry to produce quality, safe, sustainable and healthy food. |
| 2.  | Differentiate food quality attributes and apply appropriate evaluation methods. | <i>Lecture</i>                              | Presentation, Final Exam | PO1: Integrate knowledge of food science/technology/entrepreneurship principles for transformation for food industry to produce quality, safe, sustainable and healthy food. |
| 3.  | Define food microbiology and  | <i>Assignment, Lecture, Literature</i>      | Assignment               | PO4: Demonstrate the ability to perform and effectively communicate  |

Deliverable 2.4 Description of Methodology and Tools

|    |  |                                     |                             |  |
|----|--|-------------------------------------|-----------------------------|--|
|    | classify microbes in food.   | <i>Review, Dissertation/ Report</i> |                             | original research (action-based research) in the interdisciplinary areas of food sciences, technology and entrepreneurship.  |
| 4. | Describe and apply the principles of food preservation and processing. | <i>Lecture, Seminar</i>             | Progress Test, Presentation | PO1: Integrate knowledge of food science/technology/entrepreneurship principles for transformation for food industry to produce quality, safe, sustainable and healthy food. |
| 5. | Define food safety and classify hazards in food.                       | <i>Case study</i>                   | Assignment, Presentation    | PO2: Critically evaluate and apply innovative technologies for positive disruption and development of the food industry.   |

G. Indicative Content

| Topic                        | Content   | Content Sources/Resources (e.g. texts, web resources, journal articles, equipment resources)   |
|------------------------------|---|--|
| Chemistry of food components | <p>1.1) Carbohydrates – classification, structure, chemical reactions and functional properties of sugars and polysaccharides</p> <p>1.2) Proteins – classification, structure of amino acids and protein, chemical reactions and functional properties of proteins</p> <p>1.3) Lipids – structures and types of lipids, chemical reactions and functional properties of lipids</p> <p>1.4) Vitamins and Minerals – sources and classification</p> <p>1.5) Water – types and function</p> <p>1.6) Nutrition - nutrient requirement and Food Guide Pyramid</p> <p>1.7) Allergens/antinutrients</p> | <p>Bennion, M. and Scheule, B. (2015). <i>Introductory Foods</i>, 14 Ed., Pearson Education Inc. United Kingdom. ISBN-13: 978-0132739276</p> <p>Murano, P.S. (2007). <i>Understanding Food Science and Technology</i>, Thomson Wadsworth Australia. ISBN-13: 978-0534544867</p> <p>Parker, R. and Pace, M. (2017). <i>Introduction to Food Science and Food Systems</i>, 2nd Ed., Cengage Learning USA. ISBN-13: 978-1-4354-8939-4</p> <p>Jeantet, R., Croguennec, T., Schuck, P. and Brulé, G. (2016). <i>Handbook of Food Science and Technology 1: Food Alteration and Food Quality</i>, John Wiley &amp; Sons, Inc. ISBN-13: ISBN: 978-1-848-21932-8</p> <p>Reference Book Resources</p> |

|                                   |   |   |
|-----------------------------------|---|---|
| Food Quality                      | <p>2.1) Food quality attributes (colours, texture and flavour)</p> <p>2.2). Evaluation of food quality (instrumental and sensory evaluation)</p>                  | <p>deMan, J.M. Finley, J., Hurst, W.J. and Lee, C. (2018). <i>Principles of Food Chemistry</i>, 4 Ed., Aspen Publishers Inc. ISBN-13: 978-3-319-63607-8</p> <p>Sikorski, Z.E. (2002). <i>Chemical and Functional Properties of Food Components.</i>, CRC Press Boca Raton. ISBN-13: 978-0-8493-9675-5</p> <p>Fennema, O. Damodran, S. and Parkin, K. (2017). <i>Food Chemistry</i>, 5 Ed., Apple Academic Press Inc. Canada. ISBN-13: 978-1-4822-0812-2</p> |
| Food Microbiology                 | <p>3.1) Introduction to food microbiology</p> <p>3.2) Beneficial microbes in foods</p> <p>3.3) Food spoilage microbes in foods</p> <p>3.4) Foodborne pathogen</p> |   |
| Food preservations and processing | <p>4.1) Principles of food preservation and processing (thermal and non- thermal processing)</p> <p>4.2) Preservatives</p>  |   |
| Food safety                       | <p>5.1) Definition of food safety</p> <p>5.2) Microbiological, chemical and physical hazards</p> <p>5.3) Personal hygiene, Halal, HACCP and GMP</p>               |   |