

# International Master in Horticultural Science (IMaHS)

LIST OF COURSES AND TEACHING MODULES OFFERED  
AT UNIBZ IN THE THIRD SEMESTER.

Module	Semester	ECTS Credits
<b>Production Chain Management</b>	1	12
<ul style="list-style-type: none"> <li>Integrated Orchard and Vineyard Management <i>Canopy Management</i> <i>Soil and Water Management</i></li> <li>Mineral Nutrition</li> <li>Applied Entomology in Horticultural Crops</li> </ul>		6 3 3
<b>Post-harvest Chain Management</b>		9
<ul style="list-style-type: none"> <li>Supply Chain and Innovation Management</li> <li>Fruit Processing</li> <li>Post-harvest Management</li> </ul>		3 3 3
<b>Plant Protection and Disease Management</b>		9
<ul style="list-style-type: none"> <li>Plant Protection Products and Residues</li> <li>Elements of Chemistry and Biochemistry of Agrochemicals 1</li> <li>Integrated Plant Disease Management</li> </ul>	1 1 1	3 3 3
<b>Efficient Resource Use in Production Systems</b>		9
<ul style="list-style-type: none"> <li>Project Development and Management</li> <li>Applied Breeding and Sustainability</li> <li>Information and DSS in Fruit Production</li> </ul>	1 1 1	3 3 3

# Post-Harvest Chain Management

## SUPPLY CHAIN AND INNOVATION MANAGEMENT

Christian Fischer

### Learning Outcomes

Supply chain management (SCM) is concerned with the coordination of the physical flow of goods and services across space, time and different types of organizations. In this course, SCM is approached from the point of view of (industrial, or business-to-business) marketing, strategic management and transaction cost economics always with a focus on the fruit industry. The course offers an introduction into the topic and aims at providing the participants with a basic understanding of the involved issues, concepts and methods, so that they can apply them in their later job activities. In addition, the participants will learn and be able to apply the basics of innovation management, in particular collaborative innovation activities across the supply chain.

### Course Contents

- 1) Introduction
- 2) Fundamentals of supply chain management
- 3) Fundamentals of innovation management
- 4) Applications to the fruit industry
- 5) Summary

### Teaching Methods

24 hours frontal lessons, 6 hours group work.

### Readings/Bibliography

- Lecture materials and slides
- Fawcett, S., Ellram, L. and Ogden, J. (2007): *Supply Chain Management – From Vision to Implementation*. Pearson Prentice Hall, Upper Saddle River, NJ, USA
- Fischer, C. (2010): Opportunities for innovation in specialised fruit & vegetable retailing – results from an Auckland greengrocers survey. In: Hewlett, E. & Johnson, J. (eds), *Proceedings of the Australasian Postharvest and Managing Quality in Chains Conference*, Napier, New Zealand, 2009. *ISHS Acta Horticulturae* 880. Pages 91-97.

### Assessment Methods

Final exam at the end of the course. In addition, there is study project to complete which contributes up to 30% of the final module mark.

### Teaching Tools

Teaching materials (slides, scientific articles etc) made available on unibz's Leganto platform.

## FRUIT PROCESSING

MatteoScampicchio

### **LearningOutcomes**

By the end of the course, students should acquire knowledge that enables them to: identify the main key processing steps used during fruit transformation; understand the main effects of the processing on the quality characteristics of the processed fruits; have a detailed overview of main chemical and biological events occurring during fruit juice production, jam preparation, fruit drying and storage; understand the possible preventive measure to control or even enhance the stability and shelflife of the processed fruits.

### **Course Contents**

The course is designed to provide graduate students with an overview of the main processing steps used during the transformation of fruits, emphasizing the chemical, physical and biological changes occurring during processing. Specific attention will be given to the production of fresh cut fruits, fruit juices, jams, jellies and marmalades and dried fruits. Accordingly, the course will cover the following topics:

1. Fresh cut fruits;
2. Fruit juice processing
3. Enzyme use in fruit processing
4. Fruit preserves and jams making
5. Use of pectins in fruit processing
6. Drying of fruits
7. Thermal processing of fruits
8. Hurdles technologies and
9. Fruitby-products.

### **TeachingMethods**

This course involves consists of 20 hr of frontal lectures and 10 hr of practical part. The frontal lectures and topics are presented by the Professor. Practical parts, lab activities, and excursions are explained by the Professor and the Teaching Assistants. The frontal lectures will be offered with digital slides, videos and the lecture of selected scientific literatures. The practical part includes exercises with spreadsheet at the PC, laboratory activity for the measurement of the main quality fruit attributes and some practical laboratory activity on the use of enzymes and pectins in fruit processing.

### **Readings/Bibliography**

The content of the course is based on the following bibliography:

- Slides presented during the lectures.
- Mircea Enachescu Dauthy, in: Fruit and vegetable processing, FAO AGRICULTURAL SERVICES BULLETIN No.119, freely available online at <http://www.fao.org/docrep/V5030E/V5030E00.htm>

Furthermore, for a deeper understanding of the topic presented during the course, it is recommended the reading of the following book:

- Diane M. Barrett, Laszlo Somogyi, Hosahalli S. Ramaswamy in: *Processing Fruits: Science and Technology*, Second Edition, CRC Press.

### **Assessment Methods**

Coursework will be weighted as follows: final written exam (100%). It will not be possible to pass the course if the final written exam has a mark lower than 18.

### **Teaching Tools**

Generally, Power Point presentations are available in the course reserve collection database of the Faculty 1 day after each single lecture. Additional material is provided by the Professor.

## **POST-HARVEST MANAGEMENT**

Angelo Zanella

**Learning Outcomes** The course will provide students with scientific and technical knowledge on the post-harvest management of the main horticultural crops. An understanding will be developed concerning the interactions between the biological crop system at post-harvest, the surrounding environment and the influencing technical factors. This understanding will allow the students to manage future post-harvest challenges by adaptive knowledge.

### **Course Contents**

Basic knowledge of fruit histology, physiology, ripening processes and biochemistry is assumed and will be deepened during the course. The course itself is divided in two sections:

A) Understanding the inter-linkage of post-harvest principles:

Reasons and scope for the post-harvest management; single post-harvest handling principles and inter-linkage; quality and safety management; potential of non-destructive quality evaluation techniques; definition, sources, prevention of post-harvest losses; influencing post-harvest ripening; adaptive storage procedures; innovation in storage technologies

B) Post-harvest handling of the main horticultural crop categories:

Post-harvest handling of following horticultural crop categories: tropical-, subtropical fruits, small fruits, pome fruits, stone fruits, fruit vegetables, flower- leafy- stem-vegetables, underground vegetables.

### **Teaching Methods**

Frontal lessons will alternate with elements of flipped classroom and team-work with the aim of enhancing the degree of interaction and active knowledge acquisition, including lab-activities and visits.

Assessment methods: Written exam at the end of the course on the entire program (lectures, results of team-work and exercises/excursions), participation to team-work and lab activity.

**Teaching tools:** Frontal lessons aided by visual presentation. Flipped class room approach. Team work and team presentations. Lab demonstrations and exercises.

Field visits.

### **Readings/Bibliography**

Lecture notes made available after the lesson on the on-line platform of unibz; handouts and articles provided by the instructor through internet services managed by unibz.

Recommended supporting bibliography:

- R. Wills et al. (2016, 6th Ed.); Postharvest of fruit, vegetables & ornamentals; CAB International
- A. Kader et al. (2002); Postharvest technology of horticultural crops; University of California

Recommended supplementary bibliography:

- W.J. Florkowski, R.L. Shewfelt, et al. (2014); Postharvest Handling – A Systems Approach, Third Edition; Academic Press
- R. Wills et al. (2015); Advances in Postharvest Fruit and Vegetable Technology; CRC Press