

**Salahaddin University-Erbil**  
**College of Agricultural Engineering Sciences**  
**Department of Field Crops & Medicinal Plants**



**Course Book of**  
**Post-Harvest Technology**  
**4<sup>th</sup> Stage Students -**  
**Field Crops & Medicinal Plants Dept.**

**First Semester**  
**2023-2024**

**Dr. Shakir Bahaddin Shakir**  
**Lecturer**

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<b>1. Course name</b>	<b>Postharvest Technology</b>
<b>2. Lecturer in charge</b>	<b>Lecturer. Dr. Shakir Bahaddin Shakir</b>
<b>3. Department/ College</b>	<b>Field Crops / Agriculture</b>
<b>4. Contact</b>	<b>e-mail: shakr.bahadin@uor.edu.krd Tel: (optional)</b>
<b>5. Time (in hours) per week</b>	<b>Theory: 2</b>
<b>6. Office hours</b>	<b>Mondays from 8<sup>30</sup> - 2<sup>00</sup></b>
<b>7. Course code</b>	
<b>8. Teacher's academic profile</b>	<b>BSc ; Field crops 1996 MSc ; Industrial Crops 2001 PhD ; (Range Management) 2021</b>
<b>9. Keywords</b>	<b>Post Harvest; Agricultural processing Engineering; Food Engineering; Forest and Fiber Engineering</b>
<b>10. Course overview:</b>	
<p>This course explains several new topics in relation to post harvest engineering. It also starts with introduction to Agricultural processing Engineering in general (Postharvest Engineering, Agricultural Process Engineering, Food Engineering and Forest and Fiber Engineering); Overview of Postharvest Technologies (Cleaning, drying and storage).</p>	
<b>11. Course objective:</b>	
<p><b>The main objective</b> of the course is to equip students with an understanding of the scope and key concepts in the processing engineering produce to enable them to understand the operations of postharvest engineering.</p> <p><b>The specific objectives are to:</b></p> <ul style="list-style-type: none"> <li>i) Equip students with knowledge and skills in postharvest engineering operations.</li> <li>ii) Equip students with competency of how postharvest technologies are operated and managed.</li> <li>iii) Equip students with skills of using and managing various postharvest unit operations.</li> </ul>	
<b>12. Student's obligation</b>	
<ul style="list-style-type: none"> <li>1- Participation is more important, every student should be pay attention during a class. It will be encouraging them to collect information about the subjects. Next, it causes to earn all scores very well.</li> <li>2- Students should be found the topics which relationship to post harvest engineering, then make presentation. It will be not only to collect the score but also to teach them how to be a lecturer and researcher in future.</li> <li>3- There will be a short, timed, quiz once a week, on Wednesday. These quizzes will be open book and open note. Quizzes will emphasize interpreting information,</li> </ul>	

formulating hypotheses, and synthesizing concepts from lecture. I will drop the three lowest quiz scores. Quizzes will cover all course material covered to-date.

- 4- During this course two exams will be done. The first exam will be after 4 lectures, the second exam after 8 lectures or in the end of the course.

### **13. Forms of teaching**

Hard copy of the whole lectures prepared, and then I give to my students'. Also, during the class used data show and I preparing power points then explaining for students. White board also used to more understanding it is based on the subjects. Actually, for every class I have a short video (Document) about the topics. It is more important and interested for understanding students. Also, we have plan to visit some factors are relation to post harvest engineering, such as; Olive Oil Production Factory, Potato Products Factory...etc.

### **14. Assessment scheme**

#### **Assessments and Categorizing:**

- Class participation           5%
- Presentation                   5%
- Weekly quizzes               10%
- First Exam                     40%
- Second Exam                 40%

### **15. Student learning outcome:**

This class is new for students, I believe that they learning more new information about post harvest engineering.

### **16. Course Reading List and References:**

- Blond RD (ed.), (1984). Fruit and vegetable postharvest losses; Economic evaluation of postharvest losses, in The Agricultural Development Systems Project in Egypt. University of California, Davis, CA, pp. 42–48; pp. 190–194.
- Boonyakiat D, (1999). Postharvest losses of highland vegetables in Thailand. Acta Horti 483:251–254.
- Coulomb D, (2008). Refrigeration and the cold chain serving the global food industry and creating a better future: two key IIR challenges for improving health and environment. Trends Food Sci Technol 19:413–417.
- Dhatt AS, Mahajan BVC (2007). Horticulture post harvest technology harvesting, handling and storage of horticultural crops. Punjab Horticultural Postharvest Technology Centre, Punjab Agricultural University Campus, Ludhiana. <http://nsdl.niscair.res.in/bitstream/123456789/314/4/Revised+Harvesting,+Handling+and+Storage.pdf>.

- FAO (2004). Manual for the preparation and sale of fruits and vegetables: from field to market, FAO agricultural services bulletin no. 151. Food and Agriculture Organization of the United Nations, Rome.
- FAO (2009). Course on agribusiness management for producers' associations. Module 4 – Post-harvest and marketing. Santacoloma P, Roettger A, Tartanac F (eds) Training materials for agricultural management, marketing and finance, vol 8. Food and Agriculture Organization of the United Nations, Rome.
- Hao A, Zhao H et al (2012). Kenaf fiber nonwoven composites as automotive interior material: mechanical, thermal, and acoustical performance. International SAMPE Technical Conference.
- IJSG (2012). World Jute Profile—Malaysia. [http://www.jute.org/wjp/cp\\_malaysia.htm](http://www.jute.org/wjp/cp_malaysia.htm). Accessed Sept 2012.
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- Jeyanthi S, Purushothaman M et al (2011). Development of ecofriendly thermoplastics for automotive components. Proceedings of the international conference on green technology and environmental conservation, GTEC-2011.
- Kitinoja L, Kader AA (2002). Small-scale postharvest handling practices: a manual for horticultural crops, 4<sup>th</sup> edn, Postharvest horticulture series no. 8E. University of California, Davis Postharvest Technology Research and Information Center, Davis.
- Kitinoja, L., Saran, S., Roy, S. K., & Kader, A. A. (2011). Postharvest technology for developing countries: challenges and opportunities in research, outreach and advocacy. *Journal of the Science of Food and Agriculture*, 91(4), 597-603.
- Kitinoja L, AlHassan HA, Saran S and Roy SK, (2010). Identification of appropriate postharvest technologies for improving market access and incomes for small horticultural farmers in sub-Saharan Africa and South Asia. Invited paper in three parts for the IHC Postharvest Symposium Lisbon, August 23, 2010. Acta Hort (in press).
- Korsten L, (2006). Advances in control of postharvest diseases in tropical fresh produce. Int J Postharvest Technol Innov 1:48–61.
- Kumar DK, Basavaraja H and Mahajanshetti SB, An economic analysis of post-harvest losses in vegetables in Karnataka. Indian J Agric Econ 61:134–146 (2006).
- LaGra, J. A (1990). Commodity systems assessment methodology for problem and project identification. Postharvest Institute for Perishables, Moscow, Idaho.
- Smook, G. A. (2002). Handbook for pulp & paper technologists. Angus Wilde Publ.

- Symington, M. C., Banks, W. M., West, D., & Pethrick, R. A. (2009). Tensile testing of cellulose based natural fibers for structural composite applications. *Journal of composite materials*.
- Summerscales J, Dissanayake NPJ et al (2010). A review of bast fibres and their composites. Part 1—fibres as reinforcements. *Compos Appl Sci Manuf* 41(10):1329–1335.
- Parikh DV, Calamari TA et al. (2002). Refining of kenaf fibres for processing into automotive nonwovens. *Beltwide Cotton Conferences, Atlanta*.
- Moreau JP, Bel-Berger P, Tao W (1995). Mechanical processing of kenaf for nonwovens. *Tappi J*. 78(2):96–105.

17. The Topics:	Lecturer's name
<p>Total post-harvest cereal system, General information</p> <p>Important engineering properties such as physical, thermal and aero &amp; hydrodynamic properties of cereals, pulses and oilseeds</p> <p>PHT equipment's design and operation</p> <p>Cleaning and grading, methods of grading, equipment for grading</p> <p><b>First Examination (Theory)</b></p> <p>Drying, Principles, Classification- conduction, convection and radiation driers, moisture contents, theory of grain drying</p> <p>Material handling equipment; conveyer and elevators, their principle, working and selection</p> <p>Effect of temperature, relative humidity and gas composition, traditional storages structures, Modified and Controlled atmosphere storage structures</p> <p>Storage Process</p> <p>Storage of pulses, cereals, oilseeds, fruits and vegetables</p>	<p>Lecturer's name Dr. Shakir Bahaddin</p>

Food quality, measurements-destructive and non destructive methods- principles

HACCP,GMP,GAP and quality standards.

**Second Examination (Theory)**