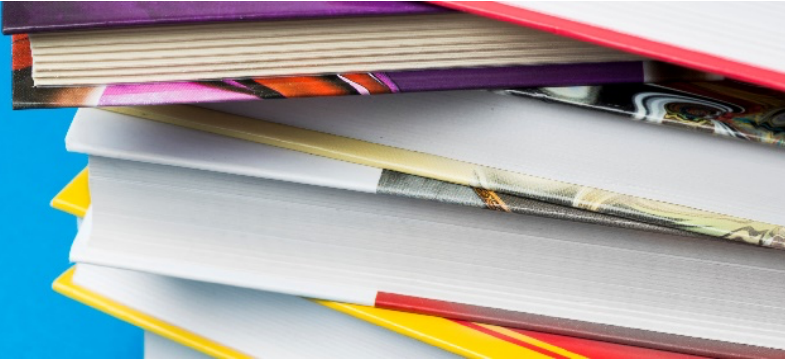
TEL AVIV UNIVERSITY אוניברסיטת תל אביב

Full Syllabus



Course Title

Alternative protein: cultivated and plant-based meat, egg and dairy

בשר מתורבת ותחליפי בשר מהצומח

Lecturer

Prof. Nir Ohad (Life Sciences), Prof. Iftach Nachman (Life Sciences), Prof. Alexander Golberg (Porter School of Environmental Studies)

Semester

Winter

Course requirements

Introductory biology (101, 102, 103), biochemistry, cell biology.
Scientific reading/writing capabilities in English.

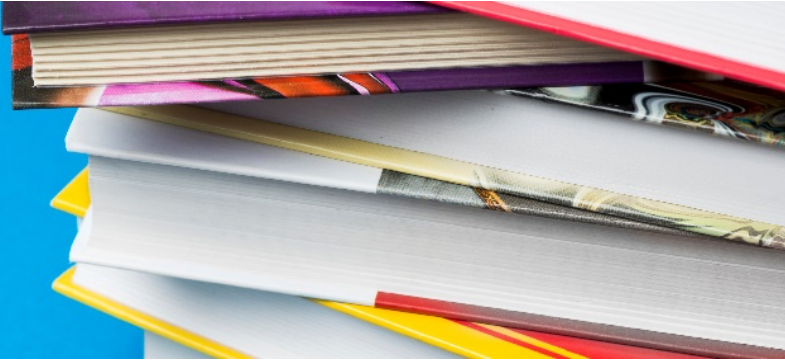
Final grade components

80% final exam + 20% 1-2 written assignments

Course Schedule 1st Semester, Monday 12-14 Hall 14 Brittania

Class no. / Date	Subject and Requirements (assignments, reading materials, tasks, etc.)
1	Introduction to cultivated meat
2	Introduction to fermentation
3	Introduction to plant-based meat – part I
4	Introduction to plant-based meat – part II
5	Cells & cell differentiation
6	Cell differentiation (cont.) + Cell culture and measurement tools
7	Tissue eng. I
8	Tissue eng. II
9	Plant Based Meat Raw Materials and optimization;
10	Plant based meat Texturization technologies, Texture nutrition optimization and regulation
11	Introduction to seaweed
12	(1) Guest lecture - Cultivated meat company (2) Guest lecture - Plant based meat company
13	Invited guest lectures: (1) Egg/Milk company guest lecture (2) State of the industry

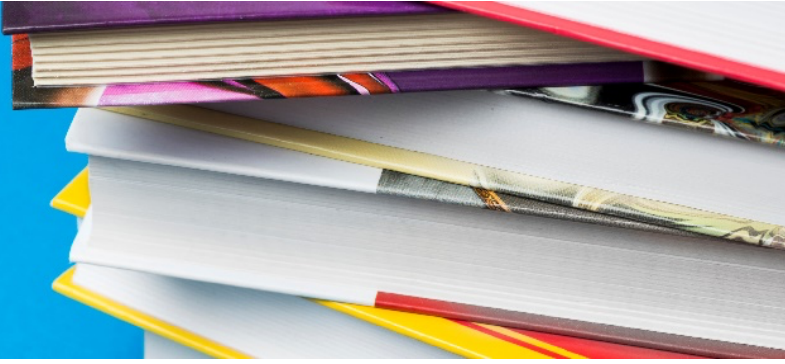
Required course reading



* Post, M. & van der Weele, C. Chapter 78 - Principles of Tissue Engineering for Food. in Principles of Tissue Engineering (Fourth Edition) (eds. Lanza, R., Langer, R. & Vacanti, J.) 1647–1662 (Academic Press, 2014). doi:10.1016/B978-0-12-398358-9.00078-1
* Ben-Arye, T. & Levenberg, S. Tissue Engineering for Clean Meat Production. Front. Sustain. Food Syst. 3, 89 (2019).
* Kyriakopoulou, K., Dekkers, B. & van der Goot, A. J. Chapter 6 - Plant-Based Meat Analogues. in Sustainable Meat Production and Processing (ed. Galanakis, C. M.) 103–126 (Academic Press, 2019). doi:10.1016/B978-0-12-814874-7.00006-7

Optional course reading

* Dey, Tania. Fennema's Food Chemistry, Fourth Edition, Edited by Srinivasan Damodaran, Kirk L. Parkin and Owen R. Fennema. Journal of Dispersion Science and Technology - J DISPER SCI TECH. 10.1080/01932691.2011.584482. (2011)
* Maskan, M. (Ed.), Altan, A. (Ed.). Advances in Food Extrusion Technology. Boca Raton: CRC Press, https://doi.org/10.1201/b11286. (2012)
* Specht, E. A., Welch, D. R., Rees Clayton, E. M. & Lagally, C. D. Opportunities for applying biomedical production and manufacturing methods to the development of the clean meat industry. Biochem. Eng. J. 132, 161–168 (2018).
* Specht, L. An analysis of culture medium costs and production volumes for cell-based meat. (2019).
* Bryant, C. & Barnett, J. Consumer acceptance of cultured meat: A systematic review. Meat Sci. 143, 8–17 (2018).
* Listrat, A. et al. How Muscle Structure and Composition Influence Meat and Flesh Quality. ScientificWorldJournal 2016, 3182746 (2016).
* Flavor of Meat and Meat Products | Fereidoon Shahidi | Springer. Available at: https://www.springer.com/gp/book/9781461359111.
* Du, M., Wang, B., Fu, X., Yang, Q. & Zhu, M.-J. Fetal programming in meat production. Meat Sci. 109, 40–47 (2015).
* Yin, H., Price, F. & Rudnicki, M. A. Satellite cells and the muscle stem cell niche. Physiol. Rev. 93, 23–67 (2013).
* Péault, B. et al. Stem and progenitor cells in skeletal muscle development, maintenance, and therapy. Mol. Ther. 15, 867–877 (2007).
* Hocquette, J. F. et al. Intramuscular fat content in meat-producing animals: development, genetic and nutritional control, and identification of putative markers. Animal 4, 303–319 (2010).
* Mehta, F., Theunissen, R. & Post, M. J. Adipogenesis from Bovine Precursors. in Myogenesis: Methods and Protocols (ed. Rønning, S. B.) 111–125 (Springer New York, 2019). doi:10.1007/978-1-4939-8897-6_8
* Miao, Z. G. et al. Invited review: mesenchymal progenitor cells in intramuscular connective tissue development. Animal 10, 75–81 (2016).
* Grzelkowska-Kowalczyk, K. The Importance of Extracellular Matrix in Skeletal Muscle Development and Function. in Composition and Function of the Extracellular Matrix in the Human Body (ed. Travascio, F.) (InTech, 2016). doi:10.5772/62230
* Qazi, T. H., Mooney, D. J., Pumberger, M., Geissler, S. & Duda, G. N. Biomaterials based strategies for skeletal muscle tissue engineering: existing technologies and future trends. Biomaterials 53, 502–521 (2015).
* Keeney, M., Han, L.-H., Onyiah, S. & Yang, F. Tissue Engineering: Focus on the Musculoskeletal System. Biomaterials Science: An Integrated Clinical and Engineering Approach 191 (2012).



* Xu, J., Towler, M. & Weathers, P. J. Platforms for Plant-Based Protein Production. in Bioprocessing of Plant In Vitro Systems (eds. Pavlov, A. & Bley, T.) 1–40 (Springer International Publishing, 2016). doi:10.1007/978-3-319-32004-5_14-1
* Day, L. Proteins from land plants--potential resources for human nutrition and food security. Trends Food Sci. Technol. 32, 25–42 (2013).
*Dey, Tania. Fennema's Food Chemistry, Fourth Edition, Edited by Srinivasan Damodaran, Kirk L. Parkin and Owen R. Fennema. Journal of Dispersion Science and Technology - J DISPER SCI TECH. 10.1080/01932691.2011.584482. (2011)
*Maskan, M. (Ed.), Altan, A. (Ed.). Advances in Food Extrusion Technology. Boca Raton: CRC Press, https://doi.org/10.1201/b11286. 2012
*Osen, R., & Schweiggert-Weisz , U. High-moisture extrusion: meat analogues. In Reference Module in Food Science (pp. 1–6). Elsevier Inc. doi: 10.1016/B978-0-08-100596-5.03099-7 . 2016
*Kinney, M.J., Weston, Zak, & Bauman J.D. Plant based meat manufacturing by extrusion. Available at https://www.gfi.org/images/uploads/2019/11/Plant-Based-Meat-Manufacturing-Guide-_GFI.pdf . 2019
*Hadnadjev, Miroslav & Dapčević Hadnađev, Tamara & Pojić, Milica & Šarić, Bojana & Mišan, Aleksandra & Jovanov, Pavle & Sakač, Marijana. Progress in vegetable proteins isolation techniques: A review. Food and Feed Research. 44. 11-21. 10.5937/FFR1701011H. 2017

Comments

The course will be in English.