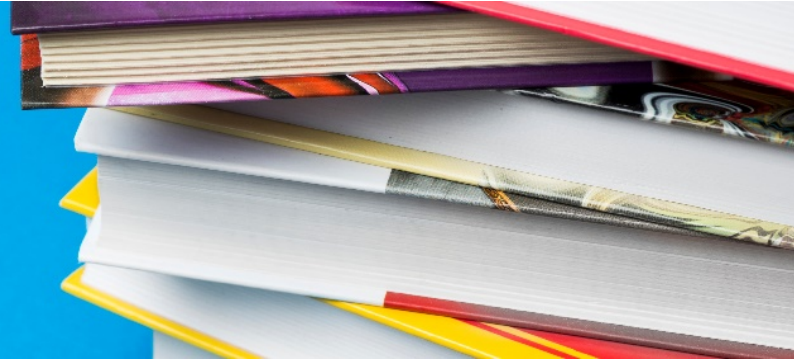




# Full Syllabus



## Course Title

Cultivated and Plant-Based Meat

## Lecturer

Dr. Tom Ben-Arye, Siddharth Bhide and Dr. Michal Halpert

## Semester

Winter

## Course requirements

Biochemistry background. Scientific reading/writing in English.

## Final grade components

60% final project 40% written assignments (2 assignments)

## Course schedule

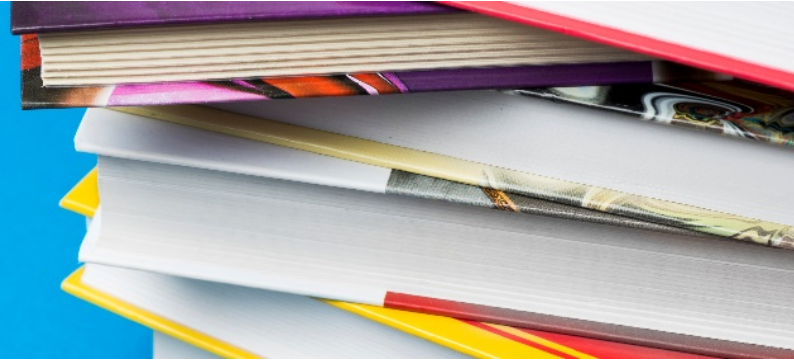
Class no. / Date	Subject and Requirements (assignments, reading materials, tasks, etc.)
1	Introduction to cultivated meat
2	Introduction to plant-based meat
3	Introduction to fermentation
4	Cells & cell differentiation
5	Cell culture and measurement tools
6	Tissue engineering
7	Tissue engineering (con)
8	Meat composition and structure.
9	Raw materials in plant based meat and associated plant processing technologies
10	Development of plant-based meat products and associated texturization technologies
11	Plant based meat regulations, IP, value chain & white space opportunity analyses
12	Invited lectures: (1) fermentation for meat alternatives. (2) Next generation plant processing technologies.
13	Invited lectures: (1) Alternative protein industry, entrepreneurship & opportunities. (2) Plant cultivation for meat alternatives.

## 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



# Full Syllabus



- \* 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

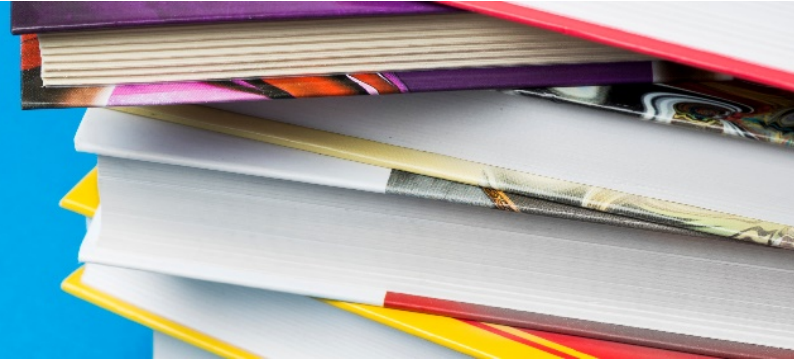
## Optional course reading

- \* 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*



TEL AVIV אוניברסיטת תל אביב  
UNIVERSITY תל אביב

# Full Syllabus



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](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. Course grade is based on assignments written in pairs and an individual final project, which requires a short literature review and article summary in English.