האוניברסיטה העברית בירושלים
THE HEBREW UNIVERSITY OF JERUSALEM

# *The Hebrew University of Jerusalem*

## *Syllabus*

# *BEHAVIORAL ECOLOGY OF POLLINATION - 71173*

*Last update 02-05-2024*

*HU Credits: 2*

*Degree/Cycle: 2nd degree (Master)*

*Responsible Department: Agroecology & Plant Health*

*Academic year: 0*

*Semester: 2nd Semester*

*Teaching Languages: English*

*Campus: Rehovot*

*Course/Module Coordinator: Sharoni Shafir*

*Coordinator Email: sharoni.shafir@mail.huji.ac.il*

*Coordinator Office Hours: By appointment*

*Teaching Staff:*

*Prof Sharoni Shafir*

*Course/Module description:*

*Pollination services are extremely valuable in both agricultural and natural ecological systems. In the course, we will focus on animal pollination, with emphasis on bees, particularly the honey bee, which is the most important pollinator in agricultural systems, but also considering bumble bees and wild bees. The first part of the course*
*is an introduction to foraging theory, which is the basis for understanding pollinator behavior. This part includes lectures on various aspects of learning theory, decision-making, behavioral ecology, and nutritional ecology, and also pollination biology, including a trip to the faculty farm for practicing sampling techniques. During the last four meetings of the course, students will present various recent papers on pollination of agricultural crops, emphasizing concepts learned during the first part of the course.*

*Course/Module aims:*

*1) Active participation in class.*
*2) Present in class and write a critical review of a paper on crop pollination. You can pick a paper from the list of papers that I supply. You are also welcome to search for other papers, and suggest a paper, but talk with me about the paper you want to choose. There is a link in Moodle to a google doc spreadsheet in which you should write your name next to the paper that you picked. Papers will be picked on the basis of the first student to pick a paper gets it.*

*The review should briefly explain the main question that the paper addresses, the research performed, main results and conclusions. Critically discuss the paper, with an emphasis on ideas and concepts in behavioral ecology of pollination that we discussed during the course. Do any of these concepts relate to the presented research? Are there concepts that you think could be pertinent to the main question addressed by the paper? Suggest future research that could incorporate one of these concepts and how would you test it.*

*The oral presentation will be 15 minutes, plus additional 15 minutes of discussion in class. During each of the three of last four weeks in which you are not presenting a paper, you will be responsible for reading in depth one of the papers that will be presented that week, to further support its discussion. Come prepared with two questions: one question about understanding what was done in the paper, or criticism of interpretation. This is a more direct question. The other question should relate to how a particular concept in behavioral ecology that we studied in class relates to the paper presented. The concept need not have been discussed explicitly in the paper. The questions will be open for discussion by all students in the class.*

*The written review needs to be up to 5 pages (double-spaced) and submitted by July 28, 2024. Reviews should preferably be written in English (but Hebrew is also an option).*

*Learning outcomes - On successful completion of this module, students should be able to:*

** understand basic concepts in behavioral ecology.*
** understand problems in pollination biology and experience various approaches to solving these problems.*
** Gain experience in critical reviews of papers on crop pollination.*

*Attendance requirements(%):*

*92*

*Teaching arrangement and method of instruction: Lectures, excursion, student presentations and discussions.*

*Course/Module Content:*

*Foraging theory; optimal foraging theory; phylogenetic, genetic, physiological and cognitive constraints; the geometric approach to nutrition. Types of floral rewards, types of floral advertisements. Learning theory; Rescorla-Wagner model. Evaluation of utility; Expectation of Average (EoA) or Average of Expectation (AoE), effect of memory span. Maximization of various currencies: net profit, rate, efficiency. Flower constancy.*

*Individual decision making.*

*Colony decision making.*
*Field trip to the agricultural experimental farm. Following honey bee behavior; pollen collectors, nectar collectors. Pollen traps. Demonstration of various crops; flower structure, sampling nectar volume and concentration.*

*Student presentations and discusssion of papers in crop pollination.*

*Required Reading:*

*List of papers in moodle.*

*Additional Reading Material:*

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*Grading Scheme:*

*Essay / Project / Final Assignment / Home Exam / Referat 60 %*

*Presentation / Poster Presentation / Lecture/ Seminar / Pro-seminar / Research proposal 25 %*

*Active Participation / Team Assignment 15 %*

*Additional information:*

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