



The Hebrew University of Jerusalem

Syllabus

BIOLOGY OF AGRICULTURAL PESTS - 71529

Last update 23-05-2024

HU Credits: 5

Degree/Cycle: 1st degree (Bachelor)

Responsible Department: Agroecology & Plant Health

Academic year: 0

Semester: 2nd Semester

Teaching Languages: Hebrew

Campus: Rehovot

Course/Module Coordinator: Yael Heifetz

Coordinator Email: Yael.Heifetz@mail.huji.ac.il

Coordinator Office Hours: Sunday 12:00-13:00

Teaching Staff:

Dr. Yael Heifetz,
Mr. belenky miki,
Ms. oria teana

Course/Module description:

Human beings have been contending with insects since prehistoric times. During the years various methods have been developed for insect control. However dependence on chemicals as an exclusive control has created pest populations that have adapted or developed resistance to the effects of certain chemicals. Over time, a pesticide which is used repeatedly will become ineffective against the resistant pest population. These problems, in addition to environmental and cost factors, have stimulated the search for alternative strategies for control of insect pests. Developing alternative means to control insect pests involve deep understanding in physiology, ecology and behavior of pests. The course will cover important phenomena (physiological, behavioral, ecological, genetics and epigenetics) that allow insect populations to become pests.

Course/Module aims:

1. Acquire basic insect physiology knowledge
2. Cover all the main pest species, identification of infestations and methods of control
3. Integrate the knowledge about pest species, their methods of control with updated knowledge about physiology, genetics and new available technology.
4. Acquire multidisciplinary understanding about alternative means to control insect pests
5. Interaction with experts in the field; creating networking and understanding of the field landscape

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

1. Acquire basic knowledge of insect physiology
2. Identify pest species
3. Acquire basic knowledge of control methods
4. New alternative means to insect pest control
5. The current problems of pest control
6. New pests in Israel agriculture

Attendance requirements(%):

Teaching arrangement and method of instruction: Lectures

Labs

Field excursions

Guest lectures

Simulations

Course/Module Content:

Lectures:

- 1. Introduction - study case (no lab)*
- 2-3. Sexual reproduction*
- 4. Asexual reproduction*
- 5. Plant protection and inspection services - talks*
- 6-7. Insect immune system*
- 8. Communication in insects*
- 9. Diapause, migration, biological clock*
- 10. Mini symposium - Insects as alternative food source, new technologies in controlling insect pests; innovations in AgTech*

Labs:

- 1. Sexual reproduction (experimental lab)*
- 2. Asexual reproduction (Homoptera)- insect vectors of virus disease*
- 3. Citrus Pests*
- 4. Insect immune system - Biological control*
- 5. Insect immune system - molecular lab (microbial control of insects - experimental lab)*
- 6. AI-based systems - pest infestation and forecast (new innovations)*
- 7. Field excursion (focus on pests of flowers (green houses) and field crops(open field))*
- 8. Plant protection and inspection services*
- 9. highlights of new alternative means to insect control*

Required Reading:

None

Additional Reading Material:

- 1. Insect physiology and biochemistry / J.L. Nation, Boca Raton: CRC Press (2002).*
- 2. Insect transgenesis: Methods and applications / Edited by A.M. Handler, A.A. James, Boca Raton, FL: CRC Press (2000).*

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3. *Insect pheromones and their use in pest management* / Edited by P.E. Howse, I.D.R. Stevens, O.T. Jones London: Chapman & Hall (1998).
 4. *Insects and plant defense dynamics* / Edited by T.N. Ananthakrishnan, Enfield, NH: Science Pubs. Inc (2001).
 5. *Insects and the plant surface* / Edited by B. Juniper and R. Southwood, London: Edward Arnold (1986).
 6. *Insect timing: Circadian rhythmicity to seasonality* / Edited by D.L. Denlinger and J. Giebultowicz, Amsterdam: Elsevier (2001).
 7. *Insect symbiosis* / Edited by K. Bourtzis, T.A. Miller, Boca Raton, FL: CRC Press (2003).

In addition, for each subject and lab there is a folder with papers to read. This includes subjects that will not be covered this year

Grading Scheme:

Active Participation / Team Assignment 5 %
Submission assignments during the semester: Exercises / Essays / Audits / Reports / Forum / Simulation / others 50 %
Attendance / Participation in Field Excursion 5 %
Other 40 %

Additional information:

None