University of Zagreb Faculty of Agriculture
Svetošimunska cesta 25, 10000 Zagreb
Phone: +385 (0)1 2393 777
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Web: www.agr.unizg.hr

Applied entomology (152068)

Course coordinator

Prof. Renata Bažok, PhD

Course description

Insects are one of the most important groups of pests of agricultural crops. Apart from great numerousness, they are also characterized by great diversity. The number of species known today is estimated at about 800,000, and according to some authors there are as many as 5 million. Each species has a certain role in the ecosystem. It is estimated that species that are harmful to agricultural crops cause annual damage of 20%. During lectures the students will obtain a detailed review of all species of insects that are important in agriculture. The biology and ecology of all important species of pests will be explained to students, with the emphasis on ecological details that affect the harmfulness and on the approach of control of each species. During the lectures the students will be acquainted with the systems for controlling each species. In the practicum the students will get knowledge of insects' morphology and identifications and will become acquainted with the symptoms of the damage that each species produces. The objective of field lessons is for the students to learn the symptoms of attacks by individual pests in production conditions. Seminar papers will be independent work in which according to the knowledge acquired and by literature searches they will suggest solutions for individual specific problems.

ECTS: **6.00**

E-learning: **L1**

Teaching hours: 60
Lectures: 30
Practicum: 22
Seminar: 8

Grading

Sufficient (2): 60-69 %
Good (3): 70-79 %
Very good (4): 80-89 %
Excellent (5): >90%

Lecturer

- Prof. Renata Bažok, PhD
- Assoc. Prof. Maja Čačija, PhD
- Assoc. Prof. Darija Lemić, PhD

Associate teacher for exercises

- Prof. Renata Bažok, PhD
- Assoc. Prof. Maja Čačija, PhD
- Helena Virić Gašparić, PhD

Type of course

- Graduate studies / MS Courses taught in English (Elective course, 1 semester, 1 year)

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General competencies

Upon completion of the module students will be able to apply the acquired knowledge in theory and practice, will be able to argue and solve the problem, will be able to manage the new situations, generate new ideas and will have the ability of team learning. The acquired knowledge students will use in conducting the protection of agricultural crops from pests and in further training on doctoral studies.

Types of instruction

- Lectures
- Practicum
  As part of the practicum, exercises in morphology and ecology of insects according to their systematic division are performed. Before each exercise, students should be prepared by mastering the basic theoretical knowledge of the morphology of individual species. Their prepared knowledge is examined by an entrance colloquium (exam) before each exercise and a certain minimum knowledge is required to access the exercises. Exercises are performed in groups (three groups of 10 to 11 students).
- Seminars
  Two students process the same scientific research and prepare a presentation using the default criteria. In a separate oral presentation every student critically reviews the work, while other students assess their performance and give precedence to one exhibitor who earns more points.

Learning outcomes

Learning outcome	Evaluation methods
Identify main pest species belonging to class of Insecta on agricultural crops and on ornamental plants, based on the symptoms of the attack and morphological traits.	Evaluation of drawings, oral exam.
Describe life cycles and ecology of main pest species belonging to class of Insecta on different agricultural crops and on ornamental plants.	Oral presentation of seminars, written and oral exam.
Plan and implement non-pesticide indirect and direct measures to prevent or reduce pest attack.	Final oral exam.
Apply appropriate methods for the forecast of pest attack.	Written and oral exams.
Based on the established attack intensity, determine the economic threshold and recommend efficient environmentally and economically acceptable control measures.	Final oral exam.
Plan and implement plant protection according to the IPM principles.	Final oral exam.
Create and present programs to protect different crops from pests.	Seminar, final oral exam.

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Working methods

Teachers' obligations

The teacher is required to conduct teaching according to the curriculum and provide students with necessary materials for studying. Furthermore, the teacher is required to provide a sufficient number of exam periods and inform the students about exam terms in time.

Students' obligations

Class attendance is mandatory for students. To get the signature, students must attend at least 80% of lectures, 80% of exercises and 100% of the seminar.
Excused absence should be documented. If the student is absent from school more than required, and without justifiable reason, the professor's signature will be denied, and the course should be re-enrolled in the next academic year. Students will get topics for seminars and will independently prepare seminars and actively participate in the presentations. During the exercises, students will observe pests under binocular microscope and will draw them.
Students can take the final exam during the semester in which they attend the course, through two written partial exams. A prerequisite for the second partial exam is to successfully pass the first partial exam. Students who do not pass the final exam through partial exams are required to take written exams during exam periods.

Methods of grading

Evaluation elements	Maximum points or Share in evaluation	Grade rating scale	Grade	Direct teaching hours	Total number of average student workload	ECTS
Entrance colloquium	20			4	36	1.2
Drawings	10			18	18	0.6
Seminars	10			8	18	0.6
1st partial written exam	15			10	27	0.9
2nd partial written exam	25			20	45	1.5
Final oral exam	20				36	1.2
Total	100 %	60-69% 70-79% 80-89% 90-100%	Sufficient Good Very good Excellent	60	180	6

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Evaluation elements	Description	Deadline	Recoupment
Entrance colloquium	Grade: Each colloquium (10 tests) is 2 points. Minimum 1 point is required to pass 1 test. Points are added up during the semester. Students can earn a maximum of 20 points through colloquia. Minimum to get the professor's signature is 11 points.		
Drawings	Grade: Passed / not passed; Student makes 10 drawings, each is 1 point. Minimum to get the professor's signature is 9 points.		
Seminars	Grade: The seminar is maximum 10 points and minimum 6 points.Points achieved on seminar add up with other points. Minimum for signature is 6 points.		
1st partial written exam	Grade: Minimum 10 points is required to pass. Points add up with other points.		
2nd partial written exam	Grade: Minimum 15 points is required to pass. Points add up with other points.		
Final oral exam	Grade: Minimum 12 points is required to pass. Points add up with other points.		
Seminars	Students orally present seminars according to the assigned topics.	By the end of the semester seminar papers should be submitted and presented during class.	Each student is obliged to complete a seminar.
1st partial written exam	Written exam about heterometabolous pests. Questions include: complementing, recognition or descriptive answer. Cheating is punished in accordance with the rules of the institution and in this case the exam is cancelled.	After the lectures and exercises about heterometabolous pests.	During the regular examination periods.
2nd partial written exam	Written exam about holometabolous pests. Questions include: complementing, recognition or descriptive answer. Cheating is punished in accordance with the rules of the institution and in this case the exam is cancelled.	At the end of the semester.	During the regular examination periods.
Final oral exam	Final oral exam of the acquired knowledge. Students must show the ability of the analytical approach to the problem, propose solutions and synthesis of possible solutions.	After completion of lectures and exercises.	During the regular examination periods.

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Weekly class schedule

1. Introduction lecture. Introduction in practicum. - Basic introduction to the module: teaching content, learnng outcomes, etimetable, exams etc. Importance of the insect pests in agricultural production. Distribution of seminar papers, repetitorium of morphological insects characteristics that are important for the identification.
2. Colembola, Orthoptera, Thysanoptera, Heteroptera - Biology, ecology, importance, harmfulness and possibility of the control of insects. Insects morphology and identifications, determining the symptoms of damages.
3. Homoptera - Biology, ecology, importance, harmfulness and possibility of the control of insects. Insects morphology and identifications, determining the symptoms of damages.
4. Hymenoptera, Coleoptera- Adephaga - Biology, ecology, importance, harmfulness and possibility of the control of insects. Insects morphology and identifications, determining the symptoms of damages.
5. Coleoptera – Polyphaga – Scarabeidae, Elateridae, Nitidulidae - Biology, ecology, importance, harmfulness and possibility of the control of insects. Insects morphology and identifications, determining the symptoms of damages.
6. Seminar papers – 1. Part - Presentations of the collected data about given topic, description of the problem and possible solutions in the written version of the presentation of the collected dana.
7. Buprestidae, Cerambicidae, Anobiidae - Biology, ecology, importance, harmfulness and possibility of the control of insects. Insects morphology and identifications, determining the symptoms of damages.
8. Scolitidae, Coccinelidae - Biology, ecology, importance, harmfulness and possibility of the control of insects. Insects morphology and identifications, determining the symptoms of damages.
9. Bruchidae, Chrysomelidae - Biology, ecology, importance, harmfulness and possibility of the control of insects. Insects morphology and identifications, determining the symptoms of damages.
10. Curculionidae - Biology, ecology, importance, harmfulness and possibility of the control of insects. Insects morphology and identifications, determining the symptoms of damages.
11. Lepidoptera – Leaf miner, Plutelidae, Gelechidae - Biology, ecology, importance, harmfulness and possibility of the control of insects. Insects morphology and identifications, determining the symptoms of damages.
12. Yponomeutidae, Sessidae, Cossidae. Lepidoptera - Yponomeutidae, Sessidae, Cossidae,Tortricidae, Pyralidae, Noctuidae, Other Lepidoptera pests. - Biology, ecology, importance, harmfulness and possibility of the control of insects. Insects morphology and identifications, determining the symptoms of damages.
13. Seminar papers – 2. Part - Presentations of the collected data about given topic, description of the problem and possible solutions in the written version of the presentation of the collected data.
14. Tortricidae, Pyralidae, Noctuidae, Other Lepidoptera pests. Diptera- Nematocera, Diptera-Tephritidae. - Biology, ecology, importance, harmfulness and possibility of the control of insects.
15. Other Diptera pests, pests in warehouses. Diptera. - Biology, ecology, importance, harmfulness and possibility of the control of insects. Insects morphology and identifications, determining the symptoms of damages.

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Obligatory literature

1. Maceljski, M. (2002): Poljoprivredna entomologija, Zrinski, Čakovec
2. Grupa autora (2004): Štetočinje povrća. M. Maceljski (ed.), Zrinski, Čakovec- selected chapters

Recommended literature

1. Dent, D. (2000): Insect Pest Management. CABI Publishing, Wallington
2. Alford, D.V. (1999): A Textobook of Agricultural Entomology. Blackwell Science, Oxford
3. Maceljski, M., Igrc, J. (1991): Entomologija- štetne i korisne vrste u ratarskim usjevima. Sveučilišna naklada Liber, Zagreb – selected chapters
4. Maceljski, M. (1991): Entomologija- štetnici voćaka i vinove loze. Sveučilišna naklada, Zagreb
5. Bailly, R. (1990): Guide pratique de defense des cultures. Association de Coordination Technique Agricole, Paris

Similar course at related universities

- Entomology II, Josip Juraj Strossmayer University of Osijek, Faculty of Agriculture
- Entomologia agraria, Università di Bologna
- Plant Protection, University of Hohenheim
- Special Problems in Entomology, Purdue University, Department of Entomology
- Entomologia speciale, Università degli studi di Bari Aldo Moro
- Entomologia agraria, Università degli studi di Bari Aldo Moro
- Special entomology II, University of Belgrade, Faculty of Agriculture
- Special entomology, University of Belgrade, Faculty of Agriculture