

### Research Methodology (Plant Protection)

<b>Obligatory module or Selective module</b>	<b>Research Methodology</b>	<b>PNH 3114</b>
<b>Semester</b>	V	
<b>Module Level</b>	Undergraduate	
<b>Module Coordinator</b>	Prof.Dr.Ir. Triwidodo Arwiyanto, M.Sc.	
<b>Lecturer(s)</b>	Prof.Dr.Ir. Triwidodo Arwiyanto, M.Sc. Prof. Dr. Ir. Siti Subandiyah, M.Agr.Sc. Dr. Ir. Witjaksono, M.Sc. Dr. Tri Joko, S.P., M.P.	
<b>Type of Module</b>	100 minutes lecture	
<b>Status:</b>	C (compulsory courses)	
<b>Exam</b>	Written	
<b>Number of participants</b>	64 students, depend on the year's batch	
<b>Credit Points:</b>	2/0 (3.02 ECTS)	
<b>Description:</b>	This course address the concept and phylosophy of research, concept and philosophy of research methodology, how to write research proposal and writing final task.	
<b>Academic goal (competency):</b>	<ol style="list-style-type: none"> <li>1. (C1) The graduates are able to work individually and in a team to ensure success in combating problems caused by pests.</li> <li>2. (C2) The graduates are fluent in communicating their ideas both verbally and written.</li> </ol>	
<b>Course outcomes:</b>		
<ol style="list-style-type: none"> <li>1. Students understand the concept and philosophy of research</li> <li>2. Students understand the concept and philosophy of research methodology</li> <li>3. Students understand the basic requirements and knowledge in being a scientist</li> </ol>		
<b>Contents:</b>		
<ol style="list-style-type: none"> <li>1. Introduction</li> <li>2. Definition of science, scientific requirements. Science tradition. Scientific society.</li> <li>3. Science : Ontology, Epistemology, Axiology.</li> <li>4. Scientific Epistemology: scientific ways and methods. Epistemology of biological science. Axiology and applied science in biological science (agriculture, phytopathology, pest sciences)</li> <li>5. Natural Science: methods and proofs of truth. Types of scientific methods, deductive and inductive technique. Positivistic experimental methods, deducto-hypotetical methods. Biological science as a parent of applied science in crop protection</li> </ol>		

6. Science and technology. Position and condition. Similarities and differences. The difference in methodology. Ethics and aesthetics in science and technology. Theology of science. Position of basic science in crop protection.
7. Types of research according its methodology: observation, survey, preliminary research, experiment, testing, efficacy, bioassay, identification and classification. Types of research in crop protection. Facilities and infrastructures of science: mathematics, statistic, language, proofs through other disciplines (chemistry, physics). The role of each in support scientific understanding. Tools and instruments of science.
8. Academic research, proof, reproof, confirmation, justification. Types of research based on function. Choice of methods: observation survey, interview, FGD, questionnaire, experiment, testing. Reproducibility.
9. Systematic of scientific, written and oral reports. Types of written report. Electronic vs print, paperless publication. Techniques in scientific report. National and international forum in crop protection, scientific organization.
10. MIDTERM
11. Scientific publication: form, requirements, format, types. Scientific writing, function, systematics, preparation. References and reference citation. Examples of scientific journals, periodicals, monographs etc in crop protection
12. Systematics of scientific writing: abstract, introduction, literature review, material and methods, results and discussion, references, appendix, summary
13. ----ditto---
14. ----ditto---
15. The differences in writing of journal article, script/thesis, seminar.
16. Other scientific writings, the right and obligations of scientific researcher. Misconduct in science (plagiarism, data manipulation, authorship etc)

**Which previous course required?** None

**Literatures:**

1. Gordon, J.C. 2007. Planning Research. A concise guide for environmental and biological science researcher. Yale University Press. 102 pp.
2. Dawson, C. 2002. Practical Research Method. A user friendly guide for mastering research method. How to Books, Oxford, England UK, 158 pp.
3. Lake, P., H.B. Benestad & B.L. Olsen. 2007. Research Methodology for Medical and Biological Sciences. Academic Press/Elsevier, Amsterdam...Tokyo, 483 pp.
4. Gustavii, B. How to Write and Illustrate a Scientific Paper. Second Edition. Cambridge University Press. 168 pp.
5. Holtom. D. & E. Fisher. 1999. Enjoy Writing Your Science Thesis or Dissertation! Imperial College Press. 278 pp.

**Material provided:** - Choices of e-books (all books mentioned above are available electronically)

- Power points slides

**Requirements for exam:** 75% presence in class, submit assignments, must be doing both midterm and final exams

<b>Teaching method(s)</b>	Lectures, question & answer sessions, self - learning through medias
Workload (hrs). <ol style="list-style-type: none"><li>1. Theoretical of course: about 24 hrs/semester</li><li>2. Lab work: none</li><li>3. Home studies: about 15 hrs/semester</li></ol>	