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| **Obligatory module or**  **Selective module** | **Research Methodology** | | **PNU 3104** |
| **Semester** | **V** | | |
| **Module Level** | **Bachelor/Undergraduate** | | |
| **Module Coordinator** | **Prof.Dr.Ir. Triwidodo Arwiyanto, M.Sc.** | | |
| **Lecturer(s)** | Prof.Dr.Ir. Triwidodo Arwiyanto, M.Sc.  Prof. Dr. Ir. Edhi Martono, M.Sc. | | |
| **Type of Module** | **1 hour and 40 minutes lecture** | | |
| **Status:** | **C (compulsory courses)** | | |
| **Exam** | **Written** | | |
| **Number of participants** | **Around 30 – 45 students, depend on the year’s batch** | | |
| **Credit Points:** | **2/0** | | |
| **Learning outcomes:**   1. **Students understand the concept and philosophy of research** 2. **Students understand the concept and philosophy of research methodology** 3. **Students understand the basic requirements and knowledge in being a scientist** | | | |
| **Contents:**   1. **Introduction** 2. **Definition of science, scientific requirements. Science tradition. Scientific society.** 3. **Science : Ontology, Epistemology, Axiology.** 4. **Scientific Epistemology: scientific ways and methods. Epistemology of biological science. Axiology and applied science in biological science (agriculture, phytopathology, pest sciences)** 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** 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, effication, bioassay, identification and classification. Types of research in crop protection. Facilities and infrastructures of science: mathematics, statistic, language, proofs through other disciplines (chemistry, physic). The role of each in support sciencetific 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, questionaire, 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** | | | |
| **Teaching method(s)** | | **Lectures, question & answer sessions, self - learning through medias** | |
| Workload (hrs).   1. Theoretical of course: about 24 hrs/semester 2. Lab work: none 3. Home studies: about 15 hrs/semester | | | |