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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**
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| **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)**
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| **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.**
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| **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
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