UIN SUNAN KALIJAGA YOGYAKARTA
FACULTY OF SCIENCE AND TECHNOLOGY
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**Undergraduate Programme in Physics**

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**MODULE HANDBOOK**

| | |
|---|---|
| Module Name | Computational Neuroscience I |
| Module level, if applicable | Bachelor |
| Code, if applicable | FIS425044 |
| Subtitle, if applicable | - |
| Courses, if applicable | Computational Neuroscience I |
| Semester(s) in which the module is taught | 6th (sixth) |
| Person responsible for the module | Anis Yuniati, M.Si., Ph.D. |
| Lecturer(s) | Anis Yuniati, M.Si., Ph.D. |
| Language | Indonesia |
| Relation to curriculum | elective course in the third year (6th semester) Bachelor Degree |
| Type of teaching, contact hours | 150 minutes lectures and 180 minutes structured activities per week. |
| Workload | Total workload is 136 hours per semester, which consists of 150 minutes lectures per week for 14 weeks, 180 minutes structured activities per week, 180 minutes individual study per week, in total is 16 weeks per semester, including mid exam and final exam |
| Credit points | 3 |
| Requirements according to the examination | Minimum attendance 75%<br>All assignments submitted<br>Attendance on time |
| Recommended prerequisites | - |
| Module objectives/intended learning outcomes | After completing this course, the students:<br>CO 1. Mastering the modelling and simulation process related to neural networks using the Neuron simulator<br>CO 2 .Mastering the principles and workings of the Neuron simulator<br>CO 3. Mastering python programming combined with Neuron simulator |
| Content | 1. Introduction to software in the field of neuroscience computing<br>2. Programming languages in the field of neuroscience computing<br>3. NEURON simulator: Installation process<br>4. Basic Programming<br>5. Model Specification and Simulation Control<br>6. Visualisation and Analysis Tools<br>7. Simple modelling and review paper<br>8. Syntax hoc<br>9. Creation of cells, channels, networks<br>10. Neurons with Python<br>11. Use of Python interpreter with hoc/nrniv objects |
| Study and examination requirements and forms of examination | The final mark will be weighted as follows: |

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| NO | Assessment methods (components, activities) | Weight (percentage) |
|---|---|---|
| 1 | Final Examination | 40% |
| 2 | Mid-Term Examination | 30% |
| 3 | Class Activities : Quiz, Homework, etc. | 30% |

The final assessment is expressed in the form of a letter value converted from a number value with the following categories:

| NO | Number Value | Letter Value | NO | Number Value | Letter Value |
|---|---|---|---|---|---|
| 1 | ≥ 95 | A | 7 | 65-69.99 | B/C |
| 2 | 90-94.99 | A- | 8 | 60-64.99 | C+ |
| 3 | 85-89.99 | A/B | 9 | 55-59.99 | C |
| 4 | 80-84.99 | B+ | 10 | 50-54.99 | C- |
| 5 | 75-79.99 | B | 11 | 55-34.99 | D |
| 6 | 70-74.99 | B- | 12 | <35 | E |

Media employed: Whiteboard, markers, LCD projector, laser pointer, power point presentation, laptop/PC

Reading list:

1. An Introductory Course in Computational Neuroscience, P.Miller, MIT Press
2. The Neuron Book, N.T.Carnevale and M.L.Hines, Cambridge University Press
3. The Neuron Simulation Environment, N.T.Carnevale and M.L.Hines, Yale University
4. Expanding NEURON's Repertoire of Mechanisms with NMODL, N.T.Carnevale and M.L.Hines, Yale University
5. Simulator Neuron : Panduan Praktis Pemrograman dalam Bidang Neurosains, S.A.Diva dan A.Yuniati, Cahaya Kata

**PLO and CO Mapping**

| | PLO 1 | PLO 2 | PLO 3 | PLO 4 | PLO 5 | PLO 6 | PLO 7 | PLO 8 | PLO 9 |
|---|---|---|---|---|---|---|---|---|---|
| **CO 1** | | | √ | | | | | | |
| **CO 2** | | | | √ | | | | | |
| **CO 3** | | | | | | | √ | | |