MODULE HANDBOOK

Module Name	Quantum Chemistry
Module level	Bachelor
Abbreviation, if applicable	8420403141
Sub-heading, if applicable	-
Course included in the module, if applicable	-
Semester/term	3rd / Second Year
Module coordinator(s)	Prof. Dr. Suyono, M.Pd.
Lecturer(s)	Dr. IGM Sanjaya, M.Si., Samik, S.Si., M.Si., and Findiyani E. Asih, S.Pd., M.Pd.
Language	Indonesian
Classification within the curriculum	Compulsory Course
Teaching format/class hours per week during the semester:	3 hours lecturers (50 min per hours)
Workload:	3 x 50 minutes lectures, 3 x 60 minutes structured activity, 3 x 60 minutes individual activity, 14 weeks per semester, 119 total hours per semester ~ 4.77 ECTS**
Credit points:	3 CU = 3 x 1.59 = 4.77 ECTS
Prerequisite course(s):	Basic Chemistry I
Targeted learning outcomes:	1. Students can take advantage of digital transformation and various other learning resources to support their understanding of quantum chemistry. 2. Students can master the concepts and basic principles of quantum chemistry which are appropriate for the structure, bonds, and characteristics of various materials in physical chemistry. 3. Students are able to make decisions in formulating solutions to quantum chemical problems related to atomic structure, chemical bonds, molecular structure, molecular symmetry, spectroscopy and molecular interactions. 4. Students have good morals, ethics and personality in completing quantum chemistry assignments independently or in groups and are responsible for communicating the results. 5. Students have Ability to integrate the concept of technopreneurship in quantum chemistry
Content:	1. Basic Concepts and Principles of Quantum Chemistry. 2. The application of quantum chemistry to translational, vibration and rotation motion

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<tr><td></td><td>3. The application of quantum chemistry to the structure of the hydrogen atom and the atom with many electrons
4. Chemical bond theory (Valence bond theory and molecular orbital theory)
5. Molecular symmetry
6. Molecular spectroscopy
7. Molecular interactions</td></tr>
<tr><td>Study / exam achievements:</td><td>Students are considered to complete the course and pass if they obtain at least 40% of maximum final grade. The final grade (NA) is calculated based on the following ratio:
<table>
<tr><td>Assessment Components</td><td>Percentage of contribution</td></tr>
<tr><td>Participation</td><td>20%</td></tr>
<tr><td>Assignment</td><td>30%</td></tr>
<tr><td>Mid-semester test</td><td>20%</td></tr>
<tr><td>Final semester test</td><td>30%</td></tr>
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<tr><td>Media:</td><td>Computer, LCD, White board, internet</td></tr>
<tr><td>Learning Methods</td><td>Individuals assignment, group assignment, discussion, and presentation</td></tr>
<tr><td>Literature:</td><td>1. Atkins, P., Paula, J.d., and Keeler, J. 2018. Atkin’s Physical Chemistry, 11th edition. New York: Oxford University Press.
2. Levine, Ira N. 2014. Quantum chemistry, 7th edition. New York: Pearson Education, Inc
3. Mortimer, R.G. 2008, Physical Chemistry, 3th edition, London: Elsevier Inc.</td></tr>
<tr><td rowspan="2">Notes:</td><td>*1 CU in learning process = three periods consist of: (a) scheduled instruction in a classroom or laboratory (50 minutes); (b) structured activity (60 minutes); and (c) individual activity (60 minutes) according to the Regulation of Indonesia Ministry of Research, Technology, and Higher Education No. 44 Year 2015 jo. the Regulation of Indonesia Ministry of Research, Technology, and Higher Education No. 50 Year 2018.</td></tr>
<tr><td>**1 CU = 1.59 ECTS according to Rector Decree Of Universitas Negeri Surabaya No. 598/Un38/Hk/Ak/2019</td></tr>
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