UNIVERSITAS NEGERI YOGYAKARTA
FACULTY OF MATHEMATICS AND NATURAL SCIENCES
DEPARTMENT OF CHEMISTRY
1 Colombo Street Yogyakarta 55281
Phone (0274) 565411, Ext. 1398, Fax (0274)548203
Website: http://kimia.fmipa.uny.ac.id, E-mail: kimia@uny.ac.id

Module name:	Quantum Chemistry
Module level, if applicable:	Undergraduate
Code:	KMA 6201
Sub-heading, if applicable:	-
Classes, if applicable:	2
Semester:	5th
Module coordinator:	Dr. Suwardi
Lecturer(s):	1. Dr. Suwardi 2. Dr. Crys Fajar Partana 3. Agus Salim, M.Si.
Language:	Bahasa Indonesia and English
Classification within the curriculum:	Compulsory Subject
Teaching format / class hours per week during the semester:	100 minutes lectures, 120 structured activities and 120 individual study per week
Workload:	Total workload is 90,67 hours per semester which consists of 100 minutes lectures, 120 structured activities and 120 individual study per week for 16 weeks
Credit points:	2 SKS (3 ECTS)
Prerequisites course(s):	Mathematics for Chemistry
Course Outcomes	After taking this course, the students are expected to be able to: CO1 Applying the concept of quantum theory in solving problems of chemical research questions CO2 Explain the results of the analysis of the concept of quantum theory CO3 Apply the concept of mathematical calculations to answer the problem of quantum chemistry calculations
Content:	Quantum Chemistry courses include learning about basic concepts in quantum mechanics, hydrogen atoms, approximation methods, quantum chemical calculations, molecular orbitals and molecular structures and chemical reactions. The subject covers 1. Quantum theory and The Wave equation, 2. Atom 3. Basic Methods of Approximation 4. Methods for many-atom systems and their applications 5. Molecular orbital and molecular structure, 6. Orbital theory of reactivity and chemical reactions
Study / exam achievements:	Attitude assessment is carried out at each meeting by

<table>
<tr><td></td><td>observation and/or self-assessment techniques using the assumption that basically every student has a good attitude. The student is marked very good or not good attitude if they show it significantly compared to other students in general. The result of attitude assessment is not taken into account in the final grades, but as one of the requirements to pass the course. Students will pass from this course if at least have a good attitude. The final mark will be weight as follow:
<table>
<tr><th>No</th><th>CO</th><th>Assessment Object</th><th>Assessment Technique</th><th>Weight</th></tr>
<tr><td>1</td><td>CO1,
CO2,
CO3.</td><td>a. Participation
b. Assignment
c. Mid-term exam
d. Final Exam</td><td>Presentation / written test</td><td>5%
25%
30%
40%</td></tr>
<tr><td colspan="4">Total</td><td>100%</td></tr>
</table></td></tr>
<tr><td>Forms of media:</td><td>Handout, Board, LCD Projector, Laptop/Computer, Module</td></tr>
<tr><td>References:</td><td>Introductory quantum chemistry (1994): A.K Chandra
Quantum Chemistry (2004): Koichi OHNO
Ideas of Quantum Chemistry (2007): LUCJAN PIELA
Quantum Chemistry (2008): Donald A McQuarrie
Quantum Chemistry (2014): Ira N. Levine
Undergraduate Quantum Chemistry (2017): Jussi Eloranta
Fisika Kuantum (2018): Rustam E. Siregar

Suggested Reading:
Ariel Caticha. (2018). Entropic Dynamics: Quantum Mechanics from Entropy and Information Geometry. Ann. Phys. (Berlin),1700408
Anton B. Zakharov. (2020). Electronic perturbation effects in the presence of electric field for π-conjugated systems: An electron-correlation study. Int J Quantum Chem 2020; e26260
Mohammad Ghashghaee. (2020). Highly improved carbon dioxide sensitivity and selectivity of black phosphorene sensor by vacancy doping: A quantum chemical perspective. Int J Quantum Chem. 2020; e26265
Thomas E. Albrecht-Schmitt. (2020). Theoretical examination of covalency in berkelium(IV) carbonate complexes. Int J Quantum Chem. 2020; e26254.
Meeri Lembinen. (2020). Calculation of core-level electron spectra of ionic liquids. Int J Quantum Chem. 2020;e26247.</td></tr>
</table>

PLO and CO mapping

	PLO									
	Attitude	General Skill		Knowledge				Specific Skill		
	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10
CO1					√					
CO2							√			
CO3									√	