

## **Bachelor Chemistry Study Programme**

The list of course in each semester in curriculum structure of Bachelor in Chemistry Study Programme is shown in Table 1. This curriculum complies with the Indonesian National Higher Education Standards (SN DIKTI) that concerns about the minimum number of course credits and group of courses. This is conducted to ensure the development of graduates for their further study, as well as to determine the transferable skills. Bachelor Chemistry Study Programme has a group of expertise that serves to determine the consistency and distribution of materials in each subject. Consistency and sustainability between courses are guaranteed by the prerequisite course system listed in the curriculum document. If a single module does not fit (anymore) into the general concept of the degree program, it will be observed in the curriculum evaluation process. In this process, academic staff and stakeholder will review and ensure that the course module supports the desired academic level achievement. The distribution of Bachelor Chemistry Study Programme courses consists of compulsory courses and elective courses that are listed in Table 1.

In order to develop the material, the students can continue their studies, develop themselves and understand the material according to the specific skills in the field of chemistry, several courses are developed, including:

- Practical laboratory work courses.
- Chemical instrumentation courses supported by chemical instrumentation workshops and apprenticeship.
- Undergraduate thesis proposal.
- Undergraduate thesis.
- Elective courses.

Table 1 List of course per semester.

Code	Course	Method	ECTS	Prerequisite
<b>Semester 1<sup>st</sup></b>				
UNI-600	Islamic Education	Lecture, discussion, presentation	3.4	-
UNI-603	Philosophy state	Lecture, discussion, presentation	3.4	-
UNI-606	English for Chemistry	Lecture, discussion, presentation	3.4	-
SKI-101	Biology	Lecture, discussion, presentation	3.4	-
SKI-102	General Physics	Lecture, discussion, presentation	3.4	-
SKI-103	General Chemistry	Lecture, discussion, presentation	6.8	-
SKI-104	Laboratory Management and Techniques	Lecture, discussion, presentation	3.4	-
SKI-105	General Mathematics	Lecture, discussion, presentation	3.4	-
SKI-106	General Physics Practical Laboratory Work	Practice	1.7	-
SKI-107	General Chemistry Practical Laboratory Work	Practice	1.7	-
<b>Total ECTS in the 1<sup>st</sup> semester</b>			<b>34</b>	
<b>Semester 2<sup>nd</sup></b>				
UNI-601	Islam <i>Ulil Albab</i>	Lecture, discussion, presentation	5.1	Islamic Education
UNI-604	Civic Education	Lecture, discussion, presentation	3.4	-
UNI-605	Sharia Entrepreneurship	Lecture, discussion, presentation	3.4	-
SKI-201	Capita Selecta	Lecture, discussion, presentation	3.4	-

SKI-202	Analytical Chemistry I	Lecture, discussion, presentation	3.4	General Chemistry
SKI-203	Inorganic Chemistry I	Lecture, discussion, presentation	3.4	General Chemistry
SKI-204	Chemical Physics I	Lecture, discussion, presentation	3.4	General Chemistry
SKI-205	Organic Chemistry I	Lecture, discussion, presentation	3.4	General Chemistry
SKI-206	Mathematics for Chemistry	Lecture, discussion, presentation	3.4	General Mathematics
SKI-207	Analytical Chemistry Practical Laboratory Work I	Practice	1.7	General Chemistry Practical Laboratory Work
<b>Total ECTS in the 2<sup>nd</sup> semester</b>			<b>34</b>	
<b>Semester 3<sup>rd</sup></b>				
SKI-301	Research Methodology and Indonesian Language	Lecture, discussion, presentation	3.4	-
SKI-302	Analytical Chemistry II	Lecture, discussion, presentation	3.4	Analytical Chemistry I
SKI-303	Inorganic Chemistry II	Lecture, discussion, presentation	3.4	Inorganic Chemistry I
SKI-304	Physical Chemistry II	Lecture, discussion, presentation	3.4	Physical Chemistry I
SKI-305	Organic Chemistry II	Lecture, discussion, presentation	3.4	Organic Chemistry I
SKI-306	Quantum Chemistry	Lecture, discussion, presentation	3.4	Physical Chemistry I
SKI-307	Electrochemistry	Lecture, discussion, presentation	3.4	Physical Chemistry I
SKI-308	Microbiology	Lecture, discussion, presentation	3.4	Biology
SKI-309	Analytical Chemistry Practical Laboratory Work II	Practice	1.7	Analytical Chemistry Practical Laboratory Work I

SKI-310	Physical Chemistry Practical Laboratory Work	Practice	1.7	General Chemistry Practical Laboratory Work
SKI-311	Organic Chemistry Practical Laboratory Work	Practice	1.7	General Chemistry Practical Laboratory Work
SKI - ---	Elected Course	Lecture, discussion, presentation	3.4	-
<b>Total ECTS in the 3<sup>rd</sup> semester</b>			<b>35.7</b>	
<b>Semester 4<sup>st</sup></b>				
SKI-401	Instrumental Chemistry I	Lecture, discussion, presentation	3.4	Analytical Chemistry II
SKI-402	Chemical Separation and Purification	Lecture, discussion, presentation	3.4	Analytical Chemistry II
SKI-403	Synthesis of Inorganic Chemistry	Lecture, discussion, presentation	3.4	Inorganic Chemistry II
SKI-404	Coordination Chemistry	Lecture, discussion, presentation	3.4	Inorganic Chemistry II
SKI-405	Computational Chemistry	Lecture, discussion, presentation	3.4	Physical Chemistry II
SKI-406	Chemical Kinetics and Molecular	Lectures, discussions, presentation	3.4	Physical Chemistry II
SKI-407	Organic Chemistry III	Lecture, discussion, presentation	3.4	Organic Chemistry II
SKI-408	Biochemistry	Lecture, discussion, presentation	5.1	Organic Chemistry II
SKI-409	Instrumental Chemistry Practical Laboratory Work I	Practice	1.7	Analytical Chemistry Practical Laboratory Work II
SKI-410	Inorganic Chemistry Practical Laboratory Work	Practice	1.7	General Chemistry Practical Laboratory Work
SKI-411	Biochemistry and Microbiology Practical Laboratory Work	Practice	1.7	Organic Chemistry Practical Laboratory Work
SKI - ---	Elected Course	Lecture, discussion, presentation	3.4	-

SKI - ---	Elected Course	Lecture, discussion, presentation	3.4	-
<b>Total ECTS in the 4<sup>st</sup> semester</b>			<b>40.8</b>	
<b>Semester 5<sup>st</sup></b>				
SKI-501	Instrumental Chemistry II	Lecture, discussion, presentation	3.4	Instrumental Chemistry I
SKI-502	Chromatography	Lecture, discussion, presentation	3.4	Analytical Chemistry II
SKI-503	Chemometrics	Lecture, discussion, presentation	3.4	General Mathematics
SKI-504	Organometallic and Bioinorganic	Lecture, discussion, presentation	3.4	Inorganic Chemistry II
SKI-505	Inorganic Compound Structure Elucidation	Lecture, discussion, presentation	3.4	Inorganic Chemistry II
SKI-506	Organic Compound Structure Elucidation	Lecture, discussion, presentation	3.4	Organic Chemistry III
SKI-507	Physical Organic Chemistry	Lecture, discussion, presentation	3.4	Chemical Organic III
SKI-508	Synthetic Organic Chemistry	Lecture, discussion, presentation	3.4	Organic Chemistry III
SKI-509	Natural Product Chemistry	Lecture, discussion, presentation	3.4	Organic Chemistry III
SKI-510	Instrumental Chemistry Practical Laboratory Work II	Practice	1.7	Instrumental Chemistry Practical Laboratory Work I
SKI-511	Chromatography Practical Laboratory Work	Practice	1.7	Analytical Chemistry Practical Laboratory Work II
SKI-512	Natural Product Chemistry Practical Laboratory Work	Practice	1.7	Organic Chemistry Practical Laboratory Work
SKI - ---	Elected Course	Lecture, discussion, presentation	3.4	-
<b>Total ECTS in the 5<sup>st</sup> semester</b>			<b>39.1</b>	

Semester 6				
SKI-601	Apprenticeship	<i>Cooperative learning</i>	3.4	-
SKI-602	Environmental Chemistry	Lecture, discussion, presentation	3.4	General Chemistry
SKI-603	Standardization	Lecture, discussion, presentation	3.4	Analytical Chemistry II
SKI-604	Hazardous and Toxic Material	Lecture, discussion, presentation	3.4	Analytical Chemistry II
SKI-605	Material Chemistry	Lecture, discussion, presentation	3.4	Inorganic Chemistry I
SKI-606	Polymer Chemistry	Lecture, discussion, presentation	3.4	Organic Chemistry I
SKI-607	Essential Oil Chemistry Laboratory Work	Lectures, discussions, presentation	3.4	Organic Chemistry I
SKI-608	Biotechnology	Lecture, discussion, presentation	3.4	Biochemistry
SKI-609	Chemical Process Industry	Lecture, discussion, presentation	3.4	-
SKI-610	Essential Oil Chemistry Practical Laboratory Work	Practice	1.7	Organic Chemistry Practical Laboratory Work
SKI-611	Chemical Structure Elucidation Practical Laboratory Work	Practice	1.7	Organic Chemistry Practical Laboratory Work
SKI - ---	Elected Course	Lecture, discussion, presentation	3.4	-
<b>Total ECTS in the 6<sup>st</sup> semester</b>			<b>37.4</b>	
Semester 7				
UNI-602	Islam as Mercy to the World ( <i>Islam Rahmatan lil Alamin</i> )	Lecture, discussion, presentation	5.1	-
UNI-608	Student Community Service	Cooperative learning	3.4	Follow the University's rule
SKI-701	Undergraduate Thesis Proposal	-	5.1	Research Methodology and Indonesian Language
<b>Total ECTS in the 7<sup>st</sup> semester</b>			<b>13.6</b>	

Semester 8				
SKI-801	Undergraduate Thesis	-	10.2	Undergraduate Thesis Proposal
<b>Total ECTS in the 8<sup>st</sup> semester</b>			<b>10.2</b>	

The bachelor's chemistry degree curriculum is designed to be completed within four academic years (eight semesters) and consists of 144 semester credit units (SCUs): 134 for compulsory courses and 10 for elected courses. As can be seen in Figure 1, after the SCU unit is converted into ECTS, it is consisting of 244.8 ECTS, which is consist of 227.8 ECTS for compulsory courses and 17 ECTS for elected courses. The compulsory courses consist of general university courses (30.6 ECTS) and chemistry courses (197.2 ECTS) including organic, inorganic, physical, and analytical chemistry, as well as biochemistry. The elective courses are divided into three areas, including chemical entrepreneurship, chemical industry, and energy & environment.

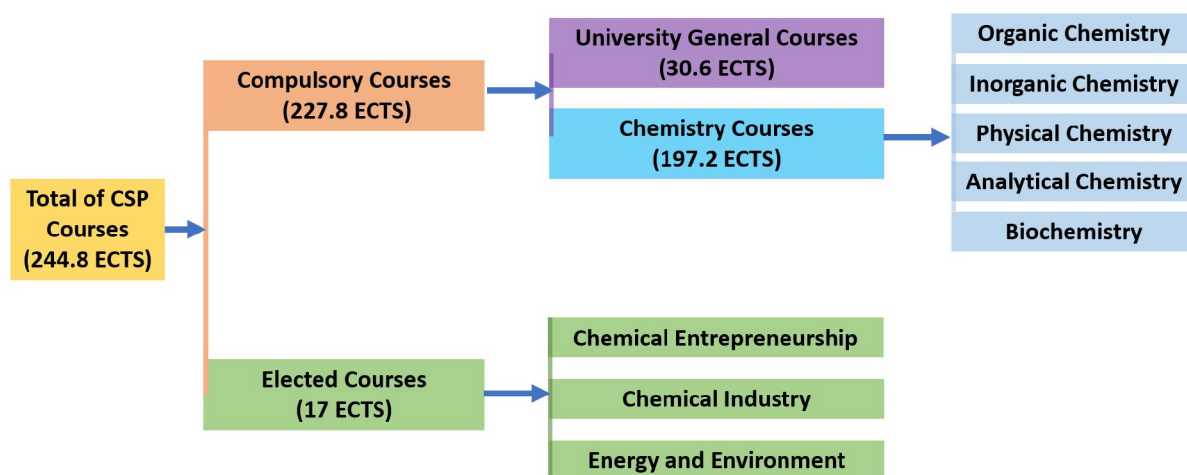


Figure 1. The Chemistry Courses in ECTS

The academic workload per semester in CSP curriculum is presented in Table 2. Course modules are completed in eight semesters (four years), with the total workload of 6,612.32 hours. The student workload is one credit for a theoretical course, which is equal to 50 minutes of in-class learning, 60 minutes of independent study, and 60 minutes of weekly assignments (16 weeks per semester). Meanwhile, one credit for a practical course is equal to 170 minutes of practical work per week which is consist of worksheets and pretest preparations, laboratory work, group discussion, literature searching, and report writing (16 weeks per semester). The comparison for workload of theory and laboratory work is presented in Table 3.

Table 2. Academic Workload per Semester in CSP Curriculum

Compulsory Courses	Credit			ECTS			Workload (hours) <sup>a</sup>		
	Semester		Total	Semester		Total	Semester		Total
	I	II		I	II		I	II	
1st Year	20	20	40	34	34	68	952	952	1904
2nd Year	19	20	39	32.3	34	66.3	904.4	952	1856.4
3rd Year	21	20	41	35.7	34	69.7	999.6	952	1951.6
4th Year	8	6	14	13.6	10.2	23.8	138.72	285.6	424.32
<b>Total Compulsory Courses</b>			134			227.8			6136.32
<b>Total Elected Courses</b>			10			17			476
<b>Grand Total</b>			<b>144</b>			<b>244.8</b>			<b>6,612.32</b>

<sup>a</sup>Calculation of workload in hours: Total ECTS per semester x 28 hours

Table 3. Workload Comparison of Theory and Laboratory Work

Courses	Credit	ECTS	Duration in Hours	Percentage (%)
<b>Theory*</b>	130	221	2,946.67*	73.20
<b>Laboratory Work**</b>	14	23.8	1,078.93**	26.80
<b>Total</b>	144	244.8		100%

Calculation of duration in hours:

\* (221 ECTS x 16 weeks x 50 minutes)/60

\*\* (23.8 ECTS x 16 weeks x 170 minutes)/60