# Assessment of General Chemistry I (KIM101 and KIM101E) Courses
## 2021/2022 Fall Semester-*PANDEMIC PERIOD-HYBRID EDUCATION*

**General Chemistry I (KIM 101 and KIM 101E)** course is designed to emphasize problem solving skills and critical thinking to engineering students as they learn the principals of chemistry and help them to focus into the world of science and engineering.

General Chemistry I courses are given in two languages; Turkish and English:
**KIM 101 Genel Kimya I**, course language Turkish (3 credits)
**KIM 101E General Chemistry I**, course language English (3 credits)

Chemistry Department opens these courses every Fall and Spring semesters with parallel sessions.

Each semester **an exam committee** is appointed to KIM 101 and KIM 101E courses from Department members who teach General Chemistry courses. The Committee assists with determining the exam content, writing new exam questions and editing exam questions to ensure that the exams are of the highest quality.

Each semester **a course coordinator** is also appointed to KIM 101 and KIM 101E courses. Course coordinator is responsible for planning and coordinating the delivery of the Course and for ensuring an appropriate assessment with the Head of the Department, who has the final responsibility. The coordinator is also responsible of organizing and grading the exam papers. At the beginning of each semester, a meeting for all KIM 101 and KIM 101E instructors is arranged by the course coordinator. Important points (related with the syllabus, the attendance to the courses, the use of legal website of the textbook (http://cwx.prenhall.com/petrucci) , etc.) are considered and are given to the attention of the instructors. Discussions on these points help General Chemistry Course Instructors for useful and reasonable ideas for the next semester.
For student queries, the course instructors allocate a 2-hour "office- hour" period. This is announced in the lectures and is indicated on a weekly course schedule hung on instructor's office door.

All the students registered in the courses, regardless of their course language, take the same midterm and final exam on the same day and at the same time. Grade distributions are done separately for Turkish and English sessions (as KIM101 and KIM101E) and all students are considered in the same grade distribution based on their course language. Students take a *multiple-choice test exam* as midterm and final exam about their general knowledge in chemistry. Exam papers are standardized so that the grade entry may be done using an optic reader. This offers the advantage of speed and lessens errors. The grades are recorded and are posted on the website (www.kimyahavuz.itu.edu.tr) and students are able to check their optic exam-answer sheets from there, as well. Additionally, syllabuses, needed documents, exam locations and announcements for the courses are given through the same website. Instructors can access information about their students and course statistics through the site https://otm.kimya.itu.edu.tr/o/.

## *Before Pandemic Period-Attendance to the Courses and Grading of Exams*

Students must attend the session (in person) for which they are registered. A minimum of **70% attendance is required**. Periodic attendance checks are taken in class. **A student who is absent for 5 lectures (over 14 lectures) gets VF** (fails without midterm or final exam)**.**

The grading scheme for the exams: **Midterm I 25 %, Midterm II 25 %, Final exam 50%.**

## *The Pandemic Period- "Distance Education" and Necessary Regulations in Course Functioning*

On March, 10th 2020, COVID-19 outbreak was declared as "pandemic" and all countries were called to take immediate actions to reduce the transmission of the disease to save lives. All over the world, this led to a sudden shift to "distance education".

Istanbul Technical University, being sensitive, to protect the health of the students, faculty members and administrative staff, decided to conduct education at undergraduate and graduate levels by the "distance learning" method in 2020-2021, under pandemic conditions.

ITU already had a large-scale, web-based electronic learning platform called "**Ninova**" (ninova.itu.edu.tr). It is an electronic learning and teaching resource making education very quick and easy, providing many facilities to instructors and students like messaging; publishing announcements, assignments, events or notes; accessing courseware content and resources at any time and place.

As soon, a new licensed platform, **"Zoom"** (https://zoom.us/) was also implemented in distance education by ITU. Zoom is a multi-platform meeting solution with a cloud platform for video and audio conferencing, collaboration, chats and webinars and can be used across computers (e.g., desktops, laptops), mobile devices and phones. Its features (like chatting, screen sharing, annotating, whiteboard, polling, breakout rooms, raising the hand, and managing participants etc.) help instructors in creating virtual classrooms. One can see every person in the session at once through gallery view and meetings can be recorded as well.

All the students and instructors were immediately supported by websites, videos, pdf files and e-mails explaining the steps and the use of **Ninova** and **Zoom** Platforms, thus a quick adaption to online education was actualized.

In a very short time, on 6 April 2020, distance education started through these two platforms (Ninova and Zoom) without problems and has been carried out successfully.

Lectures were conducted in a synchronous way, which the instructors and students are found in an electronic environment (such as video conferencing, namely Zoom platform) simultaneously and the courses were handled interactively.
All the lectures were recorded and records were available for students on Ninova without time constraint during the term. Students were also provided by lecture notes, support materials and resources through uploaded documents on Ninova, in class files of the course they are registered.

New type of education, namely "distance education" surely brought along new issues to be discussed and determined especially for in-term assessments, midterm and final exams and grade evaluations. Efforts were made in order to have the least negative influence on the success of the students and also to ensure the quality and the fairness in all manners and fields.

The Distance Education Procedures-Principles were updated by ITU Senate in the context of the "Distance Education Procedures and Principles" of The Council of Higher Education (YÖK) (https://www.yok.gov.tr/Documents/Kurumsal/egitim_ogretim_dairesi/Uzaktan_ogretim/yuksekogretim_kurumlarinda_uzaktan_ogretime_iliskin_usul_ve_esaslar.pdf).
In this frame, an attendance requirement was not applied in the courses and in-term assessments were increased by adding homework and the final exam was limited to 40%. Students should have at least 30 out of 100 from the in-term assessments to take the final exam (otherwise, VF).
As a summary, "Grading Scheme" was established as follows:

- Midterm, **40%**
- Final Exam, **40%**
- 2 Homeworks, **20%** (each contributing **10%**)

A new platform "**ITU Ayva**" (https://ayva.itu.edu.tr) was introduced by ITU Information Technology (IT) Department for online exams. It is a quick, safe and user friendly  platform for students and instructors.
Midterm and final exams were conducted online as "multiple-choice exams" by the use of **ITU Ayva** platform.

Students having power and internet outages or connection problems, or suffering from any health issues or Covid-19 disease were subjected to online make-up exams equivalent to the exams they missed.

All exam grades were recorded and were posted to the websites in use (www.kimya.itu.edu.tr  or www.kimyahavuz.itu.edu.tr) in a very short time after the exams.

Surveys, namely "**Course Satisfaction Survey**" and "**Distance Learning Satisfaction Survey**", were conducted on students by ITU Coordination Office of Quality (https://kalite.itu.edu.tr/en/) to evaluate the contentment for all courses and value the distance learning activities so that the instructors could reorganize their courses in the light of the survey outcomes and the university could make the right decisions in the field of education.


## *The Post-Pandemic Period- "Hybrid Education" and Necessary Regulations in Course Functioning- 2021-2022 Fall Semester*

Under pandemic circumstances, according to the decisions taken by The Council of Higher Education (YÖK) and ITU Senate, education was conducted face-to-face. Registered students were divided into subgroups (for example, Group A and Group B) according to the lecture hall capacities and student numbers and they followed the courses face-to-face alternately (following the masking, distancing and hygiene rules). Simultaneously, the course was broadcasted online via Zoom platform. Courses were recorded and students could access their course records from Ninova regardless of their subgroups. They could watch the records without any time and date constraint during the term.
The midterm and final exams were multiple choice tests and were conducted face-to-face. Grades were posted to www.kimyahavuz.itu.edu.tr website as usual shortly after the exams.

Grading scheme was as follows:

* Midterm Exam, **40%**
* 2 Homeworks, total **20%** (each **10%**)
* Final Exam, **40%**
* Students are required to have at least 30 out of 100 from the in-term assessments (midterm exam and homeworks) to take the final exam. (Otherwise, VF grade.)
* Course attendances were followed but not taken in consideration for a VF grade due to often changing conditions of Covid cases and pandemic.

Make-up exams were applied to students who miss the exams due to Covid-19 or any other health issues. Make-up exams were equivalent to missed exams in terms of fairness.


This semester, a total of **2508 students (KIM 101 – 1121 students and KIM 101E – 1387 students)** from various departments took the course in **33 parallel** sessions.

In Table 1, the average grades for midterm and final exams of KIM 101 and KIM 101E courses are given and compared. (KIM 101 and KIM 101E ; 2021/2022 Fall Semester.)

**Table 1.** 2021/2022 Fall– Averages of KIM 101 and KIM 101E Courses (points are over 100)

|  | Midterm | HW 1 | HW2 | Final exam | General Average |
|---|---|---|---|---|---|
| **KIM 101** | 51.58 | 90.25 | 93.53 | 47.00 | 57.81 |
| **KIM 101E** | 41.95 | 89.80 | 93.30 | 41.85 | 51.83 |

Table 2 and Table 3, shows the averages of the grades for KIM 101 and KIM 101E courses for the previous semesters.

**Table 2.** Averages for **KIM 101** sessions (2014/15 Fall-2021/22 Fall )- (points are given over 100) (*multiple choice exam)

|  | Midterm | | Final exam | General Averages |
|---|---|---|---|---|
| **2014/2015 Fall*** | 55.8 | | 48.6 | 51.48 |
| **2014/2015 Spring*** | 54.95 | | 50.44 | 52.25 |
| **2015/2016 Fall*** | 60.00 | | 42.76 | 49.66 |
| **2015/2016 Spring*** | 53.64 | | 46.4 | 49.3 |
| **2016/2017 Fall*** | 44.76 | | 39.84 | 41.81 |
| **2016/2017 Spring*** | 48.20 | | 50.44 | 49.54 |
| **2017/2018 Fall*** | 61 | | 49.8 | 54.28 |
|  | Midterm I | Midterm II |  |  |
| **2017/2018 Spring*** | 59.1 | 42.5 | 39.55 | 45.18 |
| **2018/2019 Fall*** | 63.2 | 52.55 | 46.65 | 52.26 |
| **2018/2019 Spring*** | 55.6 | 48.40 | 42.85 | 47.43 |
| **2019/2020 Fall*** | 63.20 | 53.10 | 50.00 | 54.08 |
| **2019/2020 Spring*** | 58.25 | | 37.14 | 42.42 |
| **2020/2021 Fall*** | 60.84 | | 45.61 | 42.58 |
| **2020/2021 Springl*** | 63.89 | | 48.97 | 59.78 |
| **2021/2022 Fall*** | **51.58** | | **47.00** | **57.81** |

**Table 3.** Averages for **KIM 101E** sessions (2014/15 Fall-2021/22 Fall)- (points are given over 100)

|  | Midterm | | Final exam | General Averages |
|---|---|---|---|---|
| **2014/2015 Fall*** | 48.12 | | 42 | 44.45 |
| **2014/2015 Spring*** | 55.4 | | 49.24 | 51.7 |
| **2015/2016 Fall*** | 52.68 | | 36.16 | 42.77 |
| **2015/2016 Spring*** | 53.28 | | 44.6 | 48.07 |
| **2016/2017 Fall*** | 37.6 | | 34.8 | 35.92 |
| **2016/2017 Spring*** | 48.56 | | 47.16 | 47.72 |
| **2017/2018 Fall*** | 52.29 | | 43.6 | 47.08 |
|  | Midterm I | Midterm II |  |  |
| **2017/2018 Spring*** | 59.9 | 41.65 | 41.15 | 45.96 |
| **2018/2019 Fall*** | 59.8 | 49.55 | 43.70 | 49.19 |
| **2018/2019 Spring*** | 57.25 | 47.25 | 44.35 | 48.30 |
| **2019/2020 Fall*** | 56.50 | 46.35 | 43.75 | 47,59 |
| **2019/2020 Spring*** | 61.80 | | 38.57 | 44.38 |
| **2020/2021 Fall*** | 55.48 | | 51.98 | 42.98 |
| **2020/2021 Spring*** | 66.48 | | 52.92 | 62.80 |
| **2021/2022 Fall*** | **41.95** | | **41.85** | **51.83** |

*multiple choice exam

As can be noticed from the given Tables, there is a significant difference in grade averages between English and Turkish courses, Turkish being higher. Students have difficulties in following the English courses and understanding the questions asked in the exams. This problem seems to be encountered almost in all English courses (especially for the first year students) and has to be solved university-wide.

The number of KIM 101 (Turkish session) students who passed the course (including DC and DD) were **974** over **1121** which is **86.89 %** of the total students. The number of failed students having FF and VF grades were **147**, which is **13.11 %** of the total students.

The number of KIM 101E (English session) students who passed the course (including DC and DD) were **1178** over **1387** which is **84.93 %** of the total students. Fail (FF) and (VF) grades were **209** over **1387**, which is **15.07 %** of the total students.

**Figure 1** and **Figure 2** shows the percentages of each grade for KIM101 and KIM101E for 2021-2022 Fall Semester.
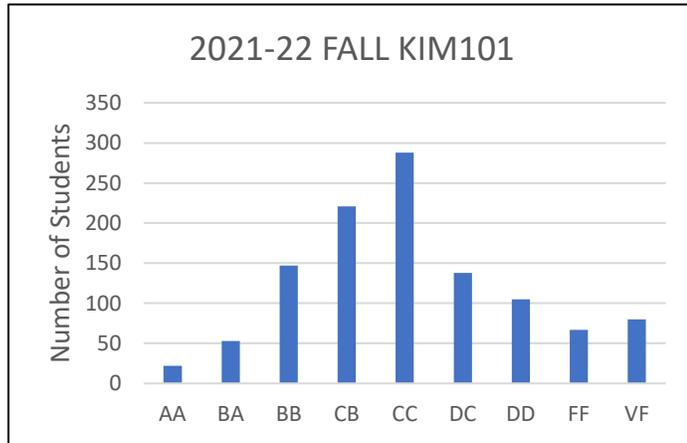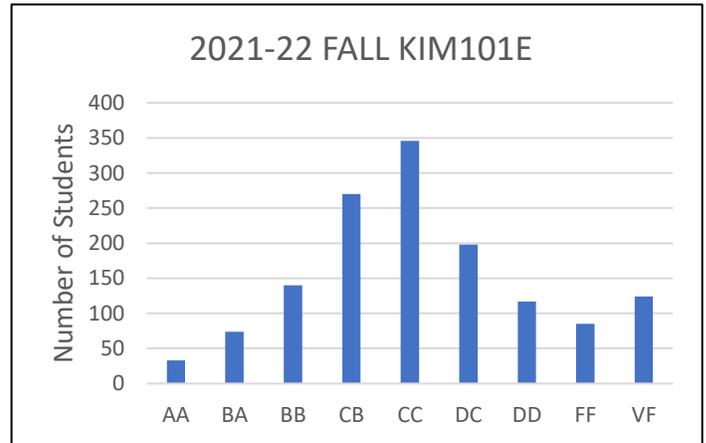


**Fig.1** Percentage-grade graph for KIM101



**Fig.2** Percentage-grade graph for KIM101E

**Table 4 and Table 5** includes the grade distributions, the number of students and percentages for each grade for KIM 101 and KIM 101E sessions for 2021-2022 Fall Semester.

**Table 4.** Grade distributions, number of students and percentages for each grade for **KIM 101** sessions

| Letter grade | Grade | Number of students | Percentage (%) |
|---|---|---|---|
| AA | Excellent | 22 | 1.96 |
| BA | Good-excellent | 53 | 4.73 |
| BB | Good | 147 | 13.11 |
| CB | Good-satisfactory | 221 | 19.71 |
| CC | satisfactory | 288 | 25.69 |
| DC | Satisfactory-low pass | 138 | 12.31 |
| DD | Low pass | 105 | 9.37 |
| FF | Fail | 67 | 5.98 |
| VF | Fail without midterm | 80 | 7.14 |

**Table 5.** Grade distributions, number of students and percentages for each grade **KIM 101E** sessions

| Letter grade | Grade | Number of students | Percentage (%) |
|---|---|---|---|
| AA | Excellent | 33 | 2.38 |
| BA | Good-excellent | 74 | 5.34 |
| BB | Good | 140 | 10.09 |
| CB | Good-satisfactory | 270 | 19.47 |
| CC | satisfactory | 346 | 24.95 |
| DC | Satisfactory-low pass | 198 | 14.27 |
| DD | Low pass | 117 | 8.44 |
| FF | Fail | 85 | 6.13 |
| VF | Fail without midterm | 124 | 8.94 |

In the following **Table 6 and 7**, 2021/2022 Fall student numbers and averages related to each department for KIM 101 and KIM 101E sessions are given, respectively.

**Table 6.** 2021/2022 Fall Averages by Departments for KIM 101 sessions
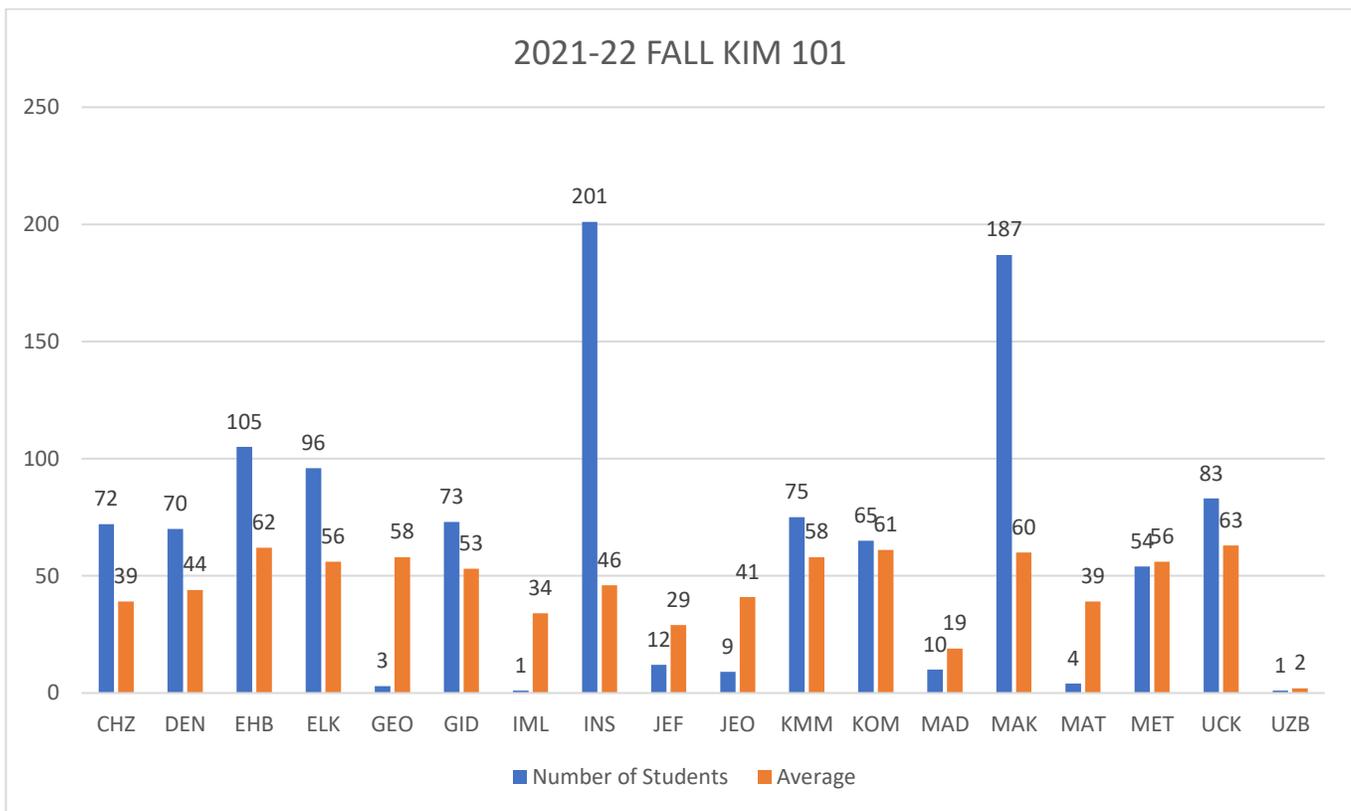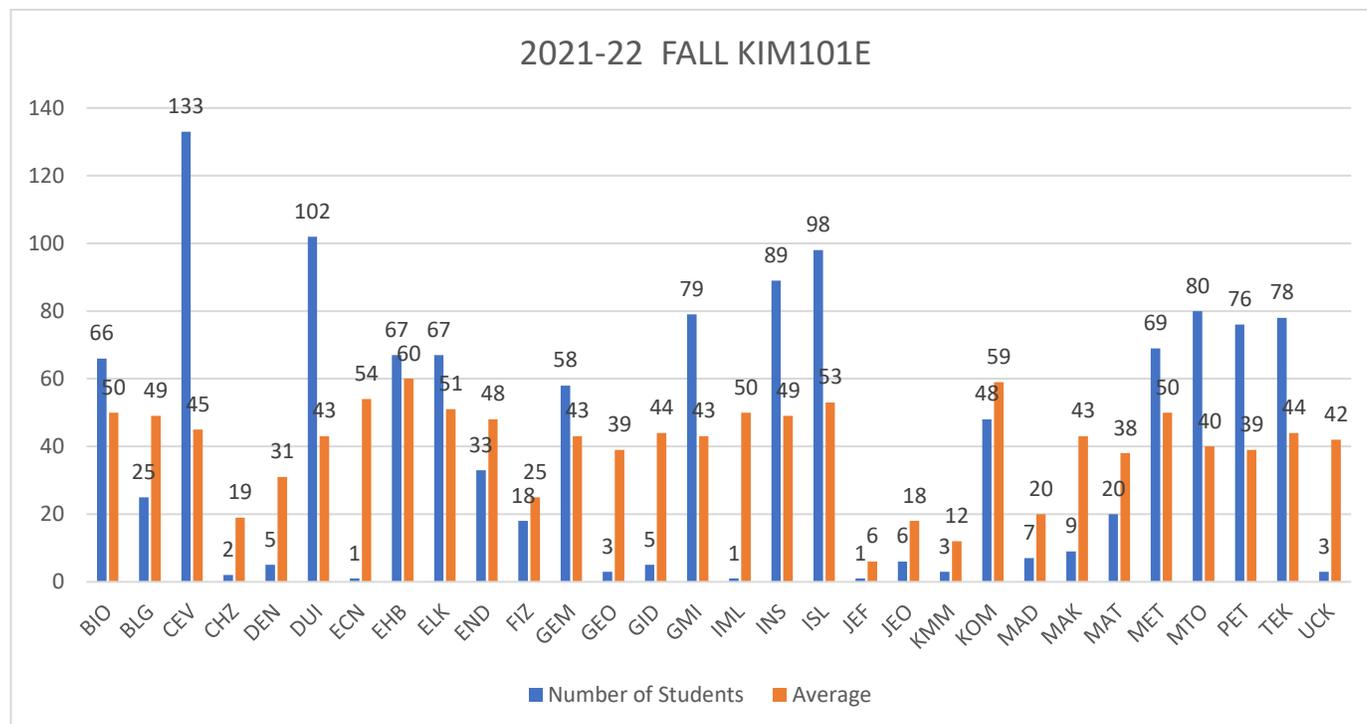
**Table 7.** 2021/2022 Fall Averages by Departments for KIM 101E sessions



Undergraduate program codes can be reached from the website: https://www.sis.itu.edu.tr/EN/about-sis/undergraduate-program-codes.php

The highest averages are from UCK (Aeronautical Engineering) and EHB (Electronics and Communication Engineering) for KIM101 and are from EHB (Electronics and Communication Engineering) and KOM (Control and Automation Engineering) for KIM101E.

There are also an access related with the course statistics (Outcomes, histograms, syllabus, etc.) through the website https://otm.kimya.itu.edu.tr/o/.

**ITU, Faculty of Science, Department of Chemistry**                                   **March 2022**

**ABET Committee**