

## ABSTRACT

In Sabancı University in Istanbul, Turkey, we offer a general Science course for freshmen, of which undergraduate Learning Assistants (LAs) are indispensable part of the teaching team. The **two-semester "Science of Nature" (NS) course** is **compulsory for all freshman students (~1000 students)** regardless of their prospective majors. The NS course is offered in a theme-based modular format, emphasizing an interdisciplinary and student-centered course structure. Lectures and weekly recitations are offered in specially designed active-learning classrooms to facilitate collaborative learning. The LAs help facilitate discussions in these classrooms led by the instructors or trained teaching assistants. Every semester since 2014 Fall, about 30 LAs are selected to become a part of the NS teaching team. All of them have taken the NS course themselves, and while majority of them are Science and Engineering majors, we have LAs from other non-Science majors as well. In addition to the weekly meetings related to the course contents, we meet with the LAs every few weeks for support sessions, in which the LAs share their experiences and feedback, and discuss topics related to collaborative learning pedagogy. We present the design and outcomes of our LA program, as well as its impact on student learning culture at Sabancı University.

## NS COURSE STRUCTURE

"Science of Nature" (NS101 & NS102) is a two-semester integrated science course for freshmen. The course aims to initiate a curiosity and desire for learning "scientific thinking" in students and at the same time introduce some of the basic concepts of physical, chemical and biological sciences in connection with questions concerning the nature and our daily life. Based on **backward course design** the course takes a **modular structure** around **four questions** from everyday life (below) to promote critical thinking and back-of-the-envelope calculation skills.

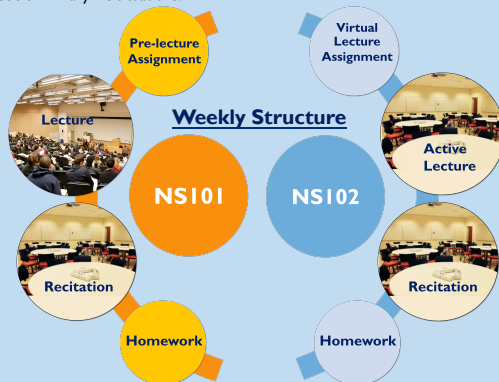
### The Module Questions:

❖ Each module is 7 weeks long, and with integrated contents

- NS101**
1. Are we alone in the Universe?
  2. Is antibiotic resistance a big threat for the humankind?
- NS102**
3. Are humans causing climate change?
  4. Can we ever comprehend the workings of the brain?

### Upon completing NS101 & 102 students should be able to:

- Demonstrate skills for critical thinking, reasoning and problem solving through integration of different concepts and information.
- Distinguish among scientific laws, hypothesis and theory and use them to differentiate facts from fiction.
- Apply mathematical concepts to solve quantitative problems.
- Demonstrate fundamental knowledge of the terminology, major concepts and theories of one or more fields in physical, chemical, and biological sciences.
- Describe the role of science and technology, and develop skills for communicating scientific concepts and facts to society in general.
- Demonstrate professionalism and ethics when using scientific approach to make informed decision in daily life situations.



## NS LEARNING ASSISTANT (LA) PROGRAM

### LA Selection Process

~40 LAs are selected each semester to work in NS101 & NS102 courses.

**Eligibility:** Undergraduate students who have passed NS101 or NS102 with B or higher

### Selection process:

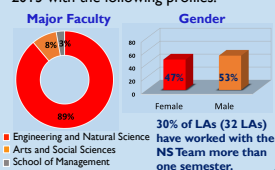
Written applications → good candidates are interviewed by the NS course coordinators

### Main selection criteria:

- Good communication skills in English
- Open to learning new teaching techniques
- Available for meetings/recitations times

### LA Profile

We have worked with **108 LAs** since 2013 with the following profiles:



## NS LA EXPECTATIONS & SUPPORT PROGRAM

### Weekly LA responsibility and working hours:

Individual Preparation	2 hr
TA/LA Meeting	2 hr
Recitations (2 sections) [or Active Lecture]	4 hr
Other course related work	1 hr
LA Support Session (only in some weeks)	1 hr
<b>Total:</b>	<b>10 hr</b> per week

### TA/LA meeting:

- Mandatory for all LAs and graduate teaching assistants (TAs)
- The whole NS teaching team gather to prepare and strategize the recitation together
- Pedagogical training and practice opportunity for TAs/LAs through active discussions

### Recitations / Active Lecture:

- Each LA attends 2 sections of recitations (2 hours x 2) or 1 section of Active Lecture + 1 section recitation (NS102 only)
- Each LA works with 2 round tables of 9 students (18 total) per recitation section
- Recitations are lead by pedagogically-trained graduate students (Master TAs)
- Active lectures are lead by instructors (faculty members)

### Financial support:

- All LAs receive hourly compensation as work-study students

## LA orientation/workshop (pre-semester, 1 day)

- Training activities on active learning + collaborative learning
- New LAs are required to attend along with new graduate teaching assistants (TAs)
- "Mock" recitation session
  - LAs work on the first week's recitation questions in groups, and the new TAs guide them as LAs would do in real recitations
- LA roles, expectations, and guiding tips
- "Meet the team" pizza lunch

## LA support sessions and training (during semester)

### Purpose:

- To provide the LAs a chance for self-reflection and receive feedback
- To share and address common issues encountered by the LAs
- To help them improve their guiding skills as a learning facilitator

### Format:

- Active discussion and activities on pedagogy
- Lead by NS course coordinators

Frequency: 3-4 times per semester (once every few weeks)

### Topics Discussed:

- Functional vs. dysfunctional groups
- Expert vs. novice problem solving approach
- Guiding by questioning
- How much help is too much help?
- Role of LAs in active-learning classroom
- To improve student learning and help them to become independent learners

### Common issues encountered by the LAs:

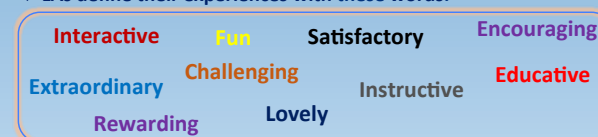
- Direct teaching instead of facilitating discussions
- Difficulties dealing with unmotivated students / so many students at once
- Language issues (using Turkish while guiding students in recitations)

## LA FEEDBACK

At the end of each semester, **certificates of award** signed by the Vice President and the Director of Foundations Development Program is given to the LAs who successfully fulfill the LA responsibilities.

The LAs prepare and present a **collaborative poster** to share their experiences at the end of each semester. Below questions and answers are selected from LA posters.

❖ LAs define their experiences with these words:



❖ Gains and challenges in their own words...

### Positive impact on students and on the LAs themselves

- I was able to **study more efficiently** for my other classes
- I got chance to know more students
- I got to know a lot of **new people from different academic backgrounds** within the university.
- I become **more confident in my speeches or presentations**. Department members are more sensitive when you have such duty.
- **Learning the subject better**
- A taste of what happens behind the scenes
- Being able to have **more empathy and being more understanding** to other lectures' TAs/LAs.

### Challenges faced as a LA

- Making the student interested in the topic.
- **Motivating** students who have never taken science before.
- Dealing with **different personalities, and ages**.
- Try to **keep students awake**
- Trying to be cheerful when I was exhausted
- Keeping myself motivated
- Working with some students who do not ever want to be interested in science.
- How to take control despite little authority
- **Managing two sessions** one after the other, which makes it 4 hours.
- Trying to cope with issues related to plagiarism.

### Skills LAs improved

- **Speech in front of a group**
- **Teaching and communication skills**
- **Leadership skills**
- **Personal time management**
- **Studying systematically**
- **Empathy**
- **Persistence**
- **Gaining confidence of students**
- **Simplifying concepts**
- **Patience**

### NS LAs are setting a great example!

NS LA program is setting an example to other courses at our university, and freshman Math courses as well as several upper-level courses are now working with LAs. Some of the NS LAs go on to contribute to other courses as their LAs.

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