**Workshop Plan (Tentative)**

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**Workshop Photos (folder)**

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**Day 1** (Tuesday, September 4) *All sessions are held in FENS G055*

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| 9:00 – 10:30 | **1. Session (90 min)** **Slides** |

- Introduction to the Workshop and the NS Method
  - NS101/102 "Science of Nature" website: http://scienceofnature.sabanciuniv.edu/
- What is Teaching & Learning?
  - Questionnaire

Whiteboard Pictures-Best way to teach science and ideal learning environment
Picture-Table 1
Picture-Table 2

- Why Active Learning?

Whiteboard Pictures- adjectives as students and professors
Picture-Table 1
Picture-Table 2

- Backward Course Design
  - ★ Group Activity: Course design

Whiteboard picture-all tables

  - ★ Table Discussion

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| 10:30 – 10:45 | **Coffee Break** |

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| 10:45 – 12:00 | **2. Session (75 min)** **Slides** |

- Mental Models
  - "Minds of Our Own" discussion (video from the pre-meeting task)
- What is "Bloom's taxonomy"?
  - ★ Group Activity: Find a list of "action verbs" and their use
    - Is there any recent modification to this that you can find?
- Learning objectives I
  - What is a good LO?
    - ★ Group Activity: Writing a SMART LO for a selected broad goal

LO-Assist children to learn a new skill
SMART LO examples you created:

- Students will be able to define a specimen they are given
- Students should be able to create a company balance sheet by using excel at the end of chapter 1

LO: I want to develop scientific literacy
SMART LO examples you created:

- Students will be able to interpret science-related news
- By giving 3 examples, students should be able to identify negative effects of climate change at the end of a week

LO: I would like to know more about the chemical make-up of common drugs used in the hospital.
SMART LO examples you created:

- Students should be able to compare chemicals inside the drugs with the chemicals inside the materials used in alternative methods

Please add here if you have more examples!

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| 12:00 – 13:00 | **Lunch** (at cafeteria in University Center) |

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| 13:00 – 14:00 | **Individual Work (60 min)** |

1. Reading: "Science of Teaching Science"
    - List pros and cons of active learning
    - List a few bullet points about how this reading is relevant to your course in your opinion
2. List advantages and disadvantages of backward course design. Think both from student's point of view and from instructor's point of view.
3. How students' mental models may affect your instructional strategies?
    - Please write your response in the corresponding google doc in your personal folder

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| 14:00 – 15:30 | **3. Session (90 min)** **Slides** |

- Reflection: Active learning + Backward course design
    - Pros and Cons of Active learning & Backward Course Design
- Learning objectives II
    - Example: NS course LOs
        - ★ Group Activity: NS learning objectives and Bloom's taxonomy
    - Apply this to your course!
        - ★ Individual: Write 4 SMART LOs for a selected topic from your course, with different levels (knowledge, comprehension, evaluation, synthesis)
        - ★ Group: Compare & Give Feedback
- Assessments I
    - Formative vs. Summative
        - ★ Individual: Research the differences between "formative assessment" and "summative assessment". List a few examples of each.

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| 15:30 – 15:45 | **Coffee Break** |

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| 15:45 – 17:00 | **4. Session (75 min)** |

- Assessments II
    - o Formative vs. Summative
    - o Types of assessments (CATs)
        - ★ Individual: List the formative & summative assessments that you could use in your course
        - ★ Group: Compare & Give Feedback
- Summary and Reflections

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| **After Meeting:** | Please watch this video clip *"Effective Group Work in the College Classroom"* [15:25] and please think about these questions while you watch:<br>• What are the three most beneficial aspect of group work?<br>• What are the three downside of group work?<br>• What could be the benefits of having students use whiteboard while solving problems / discussing concepts? |

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**Day 2** (Wednesday, September 5)

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| 9:00 – 10:30 | **1. Session (90 min)** **Slides** |

- Collaborative Learning I
    - o What are the three most beneficial aspect of group work?
    - o What are the three downside of group work?
    - o What could be the benefits of having students use whiteboard while solving problems / discussing concepts?
    - ★ Think-Group-Share: What are the roles of the instructor / TA during the group work sessions?
    - o Discussion

- Collaborative Learning II
  - ★ **Group work** question: to be given

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| 10:30 – 10:45 | **Coffee Break** |

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| 10:45 – 12:00 | **2. Session (75 min)** Slides |

https://app.tophat.com/e/545775 (Join as Guest)

- Collaborative Learning III
  - Pros and cons of group work discussion
  - Revisit: What are the roles of the instructor / TA during the group work sessions?
  - Traditional vs. Collaborative: http://groups.physics.umn.edu/physed/Research/CGPS/trdvscoop.html
  - Cooperative Group Problem Solving: http://groups.physics.umn.edu/physed/Research/CGPS/CGPSintro.htm
  - Example: Context rich problem
    - Creating Context Rich Problems (Handout)
- Collaborative Learning Techniques (CLTs)
  - What are CLTs?
  - Look through the following documents with CLT descriptions, and sign up for one CLT of your preference:
    - Cooperative Learning Techniques
    - Collaborative Learning Techniques
    - Sign-up Sheet

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| 12:00 – 13:00 | **Lunch** (at cafeteria in University Center) |

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| 13:00 – 14:30 | **Individual Work (90 min)** |

1. Research on the CLT that you selected.
2. **Please prepare a 5-min activity (to be shared with the other participants in the next session) using your CLT.**
   - Give an example with a concept from the actual class materials of yours
   - Do NOT give us just the description of the CLT without specific examples relevant to the course contents. You are NOT expected to describe the CLT itself but are expected to actually show us how the students can do the discussion / question using the CLT.
   - List pros and cons of the CLT that you chose

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| 14:30 – 15:30 | **3. Session (60 min)** |

- Collaborative Learning Techniques (CLTs)
  - ★ Activity: Each participant leads the 5-min activity of their chosen CLT to their table members
  - Each table takes notes on the strength & weakness of each techniques

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| 15:30 – 15:45 | **Coffee Break** |

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| 15:45 – 17:00 | **4. Session (75 min)** |

- CLT discussion
- Summary and Reflections
  - Please fill out the reflection question on your Question Sheet

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| **After Meeting:** | Please read "How to Ask the Right Questions" |

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**Day 3** (Thursday, September 6)

| 9:00 – 10:30 | **1. Session (90 min)** Slides |
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- ❓ The Question Box (shared with everybody) – write your questions that you may have so far

- Collaborative Learning – How can a teacher facilitate productive discussions?
  - ★ Think-Group-Share Activity:
    → Problems that the students in the video are working on

    1. First, let's watch this Clip A of students working together [2 min]. [transcript available] They are trying to answer the question: "Which, if either, has more acceleration: a car cruising steadily at 60 mph or a rocket drifting steadily at 6000 mph?"
       ⇒ What would you do if you were the instructor of this group? Write down all the things you think of doing as the instructor.
    2. Next, watch this Clip B of the student group with a TA coming around [5 min]. [transcript available]
    3. Finally, watch this Clip C of another student group [2 min] [transcript available] working with another TA.
       ⇒ Which TA (clip B or clip C) do you think is more effective, and why?

  - Discussion 1:
    - "Guide on the Side" (read the first page of "From Sage on the Stage to Guide on the Side")
  - Discussion 2:
    - Guiding Students – How to ask the right questions
      - Types of questions
      - guiding questions
  - ★ Group Activity: Create guiding questions for this question
    - What type of questions can be guiding questions?

The paper about student behaviour in those group work videos:
Student Behavior and Epistemological Framing: Examples from Collaborative Active-Learning Activities in Physics
R.E. Scherr & D. Hammer (2009) Cognition and Instruction, 27, 147

| 10:30 – 10:45 | **Coffee Break** |
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| 10:45 – 12:00 | **2. Session (75 min)** Slides |
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- Novice vs. Expert Problem Solvers
  - ★ Group Activity: Solve 2 types of questions
- Differences between novice and expert problem solver
- Learning Styles
  - What is YOUR learning style? (Take the test)
  - How does this relate to the group work / active learning?
- Common classroom experiences, challenges / sharing or exchanging experiences
  - Functional vs. dysfunctional groups
    - What do you think would happen if your students work in groups?
    - Video clips
      - Functional vs. Dysfunctional groups
      - Clicker question peer discussions
        - Good group discussion example: https://www.youtube.com/watch?v=Xq7ZB2Rt-C4
        - Bad group discussion example: https://www.youtube.com/watch?v=U46yEVMghqQ

        How can I get students to have productive discussions of clicker questions?
    - Group roles (naturally occurring in a functional group)
  - Guiding Tips
    - Tips for managing groups
    - Tips and Strategies

| 12:00 – 13:00 | **Lunch** (at cafeteria in University Center) |
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| 13:00 – 14:30 | **3. Session (90 min)** **Slides** |

- Addressing any questions you have so far (online shared question box kept open throughout the workshop)
- Flipped Classes
  - How we do it in NS
  - ★ Group discussion: Advantages vs. Disadvantages, Applicability
- Preparing for the Mock AL/Recitation
  - ★ Group Work: Work on the problem assigned, list potential difficulties, create guiding questions

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| 14:30 – 14:50 | **Coffee Break** |

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| 14:50 – 16:20 | **4. Session (90 min)** |

- Mock AL/Recitation
  - 15 min group problem solving for 3 questions; take turn to become the "guides"
  - The Questions
  - The Solutions

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**Day 4** (Friday, September 7)

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| 9:00 – 10:30 | **1. Session (90 min)** **Slides** |

- Mock recitation discussion: what worked, what didn't
  Whiteboard picture-1
  Whiteboard picture-2

- Effective teacher characteristics
  - https://www.eoas.ubc.ca/research/cwsei/resources/INSPIRE-Guidelines.pdf
  - Reformed Teaching Observation Protocol (RTOP): Reference Manual
  - How can a teacher facilitate productive discussions?
- Planning for your course
  - Start planning one change that you could apply to your course
    - pick a topic and any of the methods discussed / learned
    - assume that your students have difficulties understanding the concept(s)
    - how would you help them better with this new instructional strategy?
  - To be presented the following day
- Free working time (prepare to present your plan in 5 min)
  - Make sure that it's doable, as detailed as possible
  - If you are not teaching next semester, who can you work with?

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| 10:30 – 10:45 | **Coffee Break** |

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| 10:45 – 12:00 | **2. Session (75 min)** |

- Table sharing of the plan, select one group for class discussion

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| 12:00 – 13:00 | **Lunch** (at cafeteria in University Center) |

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| 13:00 – 14:30 | **3. Session (90 min)** |

- 4-5 selected presentations, giving feedback to each other's plan

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| 14:30 – 14:50 | **Coffee Break** |

| 14:50 – 16:20 | **4. Session (90 min)** |
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- Summary, Reflection and Conclusion
  - Foreseen issues, questions
  - Sharing NS cases, experiences
- The questions to consider (scroll down to the highlighted part, also listed below):
  - What do I plan to accomplish?
  - How will I know that students are learning?
  - What are the strengths of the students that I plan to build on?
  - What are potential weaknesses?

  **After the lesson:**
  - Reflect on student learning, providing specific examples of what students said (verbatim) during that lesson that showed evidence of understanding.
  - What did I accomplish?
  - What did student understanding look like?
  - What were their strengths?
  - What were their weaknesses?
  - What would I change in the lesson now?

| 16:30 – 17:00 | **Optional Session** |
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- Q&A session on the NS course at Sabancı University
  - Education technologies
  - MTA/LA programs & training
  - Active-learning classrooms
  - Material development
  - Outcome

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*End of the Workshop*