WELCOME!

Who am I?

Who are you?

Quick mentimeter survey to get everyone on the same page!
OUTLINE

1) Why teach?
2) How to teach at the IST
3) Research on teaching and learning
4) Active classroom learning and small classes
5) Course development
6) Assessment
7) Inclusive teaching
8) How to document your teaching experience
WHY TEACH?

1. To be *competitive*, most faculty positions require teaching.

2. Once you take next step to a faculty position teaching undergraduate is a *good recruitment* ground for Master- and PhD students.

3. Keep your teaching portfolio up to date—*you develop* as a teacher.

4. Usually very *gratifying* (and you learn)
1. Teaching is encouraged. Anyone can propose and run course. Currently 25% of courses are run or co-run by postdocs. Students mostly TA and run pre-semester courses.

2. Course proposals are submitted to Grad school. Deadline 15th of May.

3. Talk to your track rep about your idea and investigate if there is a need and an interest, talk to student track reps.
Organization of the IST Graduate school

DEAN  
Nick Barton

Program chair  
Gasper Tkacik

TRACKs

BIOLOGY  MATHS  COMPUTER SCIENCE  PHYSICS  NEUROSCIENCE  DATA SCIENCE AND SC

Faculty Track reps  Student Track reps
WHICH COURSES ARE OFFERED AT IST

Graduate school website:
https://phd.pages.ist.ac.at/student-resources/
WHICH COURSES ARE OFFERED AT IST

Courses

Most courses at IST Austria are open to PhD students, postdocs, technicians, interns, and staff members. External participants can also attend courses at IST Austria, currently free of charge. Please note that IST Austria PhD students will be given priority in case the number of places on a course is limited.

Course schedules and a full course list are available below. Please also see the academic calendar.
AY 2019/20

Courses for 2019/20

Search courses

Course categories: Graduate School / AY 2019/20

- Microfluidics
- Classics in Evolutionary Biology
- Structural Biology
- Bioinformatics I (Genomics and Gene Expression Analysis)
- Developmental Biology
Faculty track rep & Student track rep

Organization & People
There are people who students will likely interact with over the course of the PhD, and who can provide support or answer queries when the need arises. The sections below outline who they are and in what capacity they act.

> Dean
> PhD Program Chair
> Track Reps
> Mentors
DEADLINE 15th of May
FRAMEWORKS AROUND TEACHING AND LEARNING

**INSTRUCTIVISM**
- Learning occurs through instructions from teacher
- Mainly teacher being active
- Student mostly passive recipient
- Knowledge is possessed by teacher

**CONSTRUCTIVISM**
- Learning occurs when students construct their own understanding
- Emphasis on meaning, reflection and context
- Teacher provides context and opportunities to show learning
- Education focus on learner

**SOCIO-CULTURAL LEARNING**
- Learning a social concept
- Learning occurs through discussion, exchange of ideas and questions
BLOOM’S TAXONOMY REVISITED & REVISED

Classification of Educational goal by Benjamin Bloom et al 1956, revised 2001
“A taxonomy for Teaching, Learning and Assessment”

One of the most important concepts that has shaped education.

Bloom’s Taxonomy

- **Remember**: Recall facts and basic concepts
- **Understand**: Define, duplicate, list, memorize, repeat, state
- **Apply**: Use information in new situations
- **Analyze**: Use information to compare, contrast, distinguish, examine, experiment, question, test
- **Evaluate**: Justify a stand or decision
- **Create**: Produce new or original work

- **Surface learning**: Understanding—true knowing
- **Deep learning**: Higher order thinking

Direction you want your students to take
“Active learning involves providing opportunities for students to meaningfully talk and listen, write, read, and reflect on the content, ideas, issues and concerns of an academic subject”

Active learning focus on developing student’s skills rather than transmitting information

- High student participation, students are doing discovery, processing and applying information
- Peer learning and use of electronic tools, teacher walking between tables, highly interactive
- Student must enter class prepared to use assigned reading material.
- How is it done? Classroom is set up to form groups, (white) boards, screens
- What are the benefits?
  - higher order thinking,
  - inclusive, better learning outcomes,
  - promoting generic skills

“Instructional activities involving students in doing things and thinking about what they are doing” (Boywell & Eisner. Active learning: creating excitement in the classroom. ASH and ERIC: Higher education report no.1 (1981))
Example of active learning classroom:

- "Active Learning Classrooms at UC Berkeley"
  https://www.youtube.com/watch?v=BSmoezXh28E

“Why use Active Learning?”
https://www.youtube.com/watch?v=8oKwb8y6RQQ
WORLD ECONOMIC FORUM identified skills in their report (2016): “The future for Jobs”

- Complex Problem Solving
- Critical Thinking
- Creativity
- People Management
- Coordinating with Others
- Emotional Intelligence
- Judgment and Decision Making
- Service Orientation
- Negotiation
- Cognitive Flexibility

Source: Future of Jobs Report, World Economic Forum

The average test scores were 41 +/- 1% in the control section and 74 +/- 1% in the experimental section.
Freeman et al. *Active learning increases student performance in science, engineering and mathematics.* PNAS 2014

Meta-analyses of 225 studies on undergraduate STEM courses under traditional vs active learning style teaching.

**Improvements in Examination scores**

Effect size for difference in means (Hedge’s g):
- 0.5 → medium effect
- 0.8 → large effect
Freeman et al. Active learning increases student performance in science, engineering and mathematics. PNAS 2014

Large effect on fewer failures

“The data suggest that STEM instructors may begin to question the continued use of traditional lecturing in everyday practice…”

“…support active learning as the preferred, empirically validated teaching practice in regular classrooms”

Freeman et al 2014

- Do the findings change your view on teaching and learning?
- How can you use active learning in your subject?
Alignment Teaching (based on constructivism) and exam (learning outcome) goes hand in hand (Briggs 2003)

The course planning process

- Expected Learning outcomes
- Teaching and learning activities
- Assessment

EVALUATION

Brigitta Olsson IST
Alignment Teaching (based on constructivism) and exam (learning outcome) goes hand in hand.

The course planning process

What should students know?

How can learning be supported?

How do we know what the student knows?
Why assess?

Student influence & Quality Assurance

in other words:

to evaluate if learning outcomes are met and
if course content and delivery is in line with learning outcome
EVALUATIONS: FORMATIVE VS SUMMATIVE ASSESSMENTS

**SUMMATIVE**
- End of course exam/test/presentation
- Student course evaluation
- “the whole picture”

**FORMATIVE**
- Throughout the class to monitor towards achieving learning objectives (at any time)
- Improve (adjust & direct) teaching and learning simultaneously
- Clear misconceptions early
- Non-graded
FORMATIVE ASSESSMENT

Class room assessment techniques

Memory matrix

Muddiest point

Quiz

Set a problem

One minute paper
INCLUSIVE LEARNING

• Active learning approaches make classrooms more inclusive e.g. for the economically and educationally disadvantaged.
  Haak et al (2011) *Increased structure and active learning reduce the achievement gap in introductory biology.*
  Science 332,1213-1216

• Avoid stereotypes of any form, embrace diversity

• Provide positive role models (instructor’s comments & behaviour)

• Be aware and knowledgeable of Learning Difficulties:

To make it easier for all:

1. Clear instructions, communicate clearly what is expected, provide learning material online (lecture slides, pre-recorded lectures). Ideally in advance.

2. Make slides with colored background

Brigitta Olafsson IST
INCLUSIVE LEARNING

Warm tones tend to help all readers

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Rello & Bigham (2017)
• As a professional teacher you are reflective and purposeful about your teaching. Make informed choices about course development & teaching formats. As a teacher you are learning and developing.

• Teaching philosophy: your conception of teaching and learning

• Teaching portfolio: a qualitative and quantitative educational CV

• Aim of portfolio: WHAT have you done? HOW did you do it? WHY did you do it this way?
PROFESSIONAL DEVELOPMENT

• Content of your Teaching portfolio:

Statement of teaching philosophy (your view of knowledge, learning & students)
Description of teaching experience
Experiences from administration of education (course planning, director of studies)
Professional development in education
Production of course material (online, assessments etc)
Course evaluations

• Three types of contents:
  1) Information from yourself
  2) Information from others (get a colleague to assess your teaching, peer-review)
  3) Information about results (course evaluations, exam results, evidence)
SUMMARY

• Teaching has come along way from instructor-led lecturing style
• Large and small classes can be interactive

As a teacher:
• Encourage student involvement
• Align learning outcomes with curriculum
• Use formative assessment to monitor learning and teaching effectiveness
• Create a safe and inclusive learning environment

Continuously develop yourself as a teacher:

Develop your Teaching philosophy
Read, implement, document outcome
“I hear and I forget
I see and I remember
I do and I understand”
MANY THANKS AND GOOD LUCK!
A MINUTE PAPER

Formative assessment

Please answer the following questions:

1. What are the most significant things you have learned so far during this session?
2. What would you like to explore further?
3. Was there anything you didn’t understand?