ES Pedagogy – Best Practices in Course Management

What is this Handbook About?

This handbook provides important guidelines about **Best Practices in Course Management**, which should help instructors manage and deliver courses efficiently. Adherence to these practices, will, in particular, **help students make the most of your course**.

Things to Do Before the Course Starts…

Once you have been assigned a course, you should carefully execute the following:

- Review previous course files, course review forms, and course outlines to formulate the best course outline based on OBE system

  - **Course Outline should include** at least the following: Instructor's email address, office number, office hours, policies (attendance etc.), course and reference books, details of software to be used, diverse assessment methods (with weightage & CLO mapping) and lecture breakdown.

- **Identify and suggest effective tools and course components**, e.g., Complex Engineering Problems (CEPs) to the curriculum committee/Dean FES, as required.

- If a **Teaching Assistant** (TA) is assigned, guide him/her on all the necessary tasks, responsibilities, and ways of working, especially concerning Course Management System (CMS).

- In case of a **co-requisite Lab course**, hold a preliminary meeting with the assigned lab engineer to plan and discuss the lab contents/experiments, Open-Ended Lab (OEL) and Project List.

Things to Do During the Course…

Adopting the following practices during the course will help students make the most of your course

- **Make a central course material repository** (CMS, MS teams, Google Drive etc.) and provide students access to it early on.
    - A **typical course repository** may include folders such as: Course Outline, Assignments, Lecture Slides/Discussed topics, Software, Quizzes, Reference Material and Exam Samples etc.
- Provide a properly prepared **OBE-based course outline** to students (via email and in course repository) and discuss it in the introductory lecture.
- **Update attendance** on CMS regularly (**at least once every two weeks**) and ask students to approach you or TA early on if they see any discrepancy.
    - Important: **in case of any technical issue with CMS**, please adopt one of the following approaches:
        - Send attendance sheet by email.
        - Upload attendance record in the course repository.
- Conduct OBE-based assessment (quizzes, assignments, projects etc.) on reasonably regular intervals (**avoid leaving all/most assessments for the final weeks**)
    - Important aspects:
        - **Familiarize yourself well with various levels of Bloom's Taxonomy** and make sure your assessments match the claimed levels.
        - Make special effort to encourage holistic learning by introducing **diverse set of assessments** including projects, presentations, and use of modern tools.
        - In particular, **avoid/minimize assessments that may encourage rote memorization**.
- Provide **assessment results** and solutions to the students regularly (at most within two weeks of the assessment). Encourage students to discuss their performance with you and their advisor.
- In the case you have been assigned a **TA**, the following practices may be employed:
    - Provide detailed assessment solution and marking scheme to the TA
    - Ask your TA to announce assessment discussion time to the students
    - Ask your TA to email you all course relevant data and file samples after every activity/assessment (to avoid loss of data).
- **Build course file gradually** throughout the semester.
- Provide timely feedback regarding any **equipment/facilities issues** to the Dean

Things to Do After Course Completion…

- Carefully **complete the course file** and submit for review.

- Assess and **analyse shortcomings** in the course and suggest changes (via the course review form), if needed.
- Carefully **go through student evaluation** of the course (once available) to see areas of improvement for next iteration of the course.

In Case You Have More Questions…

Faculty OBE Coordinator, Dean, or members of the ES Pedagogy & Trainings Unit may be approached for further queries.

ES Pedagogy – Lab Instructors' Handbook

What is this Handbook About?

Laboratory classes provide students with first-hand experience with course concepts and with the opportunity to explore methods used by scientists in their discipline. Leading a laboratory session has particular challenges and opportunities that differ from those in a standard classroom environment.

At GIKI-FES laboratory classes are typically led by graduate student TAs. The TA needs to know and review the experiment, plan clear explanations, and create questions to stimulate student thinking. In addition, it is the responsibility of the TA to ensure that safety standards are followed. This handbook contains a variety of resources to help TAs insure that they, and the undergraduate students they teach, get the most out of the laboratory class.

What are the Typical Goals of a Laboratory Class?

Potential **goals** of laboratory classes include:

- Develop intuition and deepen understanding of concepts.

- Apply concepts learned in class to new situations.

- Experience basic phenomena.

- Develop critical, quantitative thinking.

- Develop experimental and data analysis skills.

- Learn to use scientific apparatus.

- Learn to estimate statistical errors and recognize systematic errors.

- Develop reporting skills (written and oral).

- Practice collaborative problem solving.

- Exercise curiosity and creativity by designing a procedure to test a hypothesis.

- Better appreciate the role of experimentation in science.

- Test important laws and rules.

- Develop an appreciation for research in the field.

What Should I Consider When Preparing to Conduct a Lab?

As you **prepare** to conduct a lab, consider the following questions:

- Will I be able to do the lab myself before class?

- Am I familiar with the materials and equipment?

- What are the safety considerations?

- Would it help if I gave my students a handout highlighting key theoretical, procedural, and safety points?

- How can I link this lab to the professor's lecture?

- How can I clearly communicate the criteria used in grading the lab reports?

- What kind of preparation should my students do before they come to lab?

- What tips can I give my students, so they can complete the lab successfully within the time allotted?

- Would it be helpful if I demonstrated new techniques to the students?

- How will I monitor student progress in the lab?

- Where might my students run into difficulty completing the experiment?

- What kinds of questions should I ask my students to stimulate their thinking and to encourage deeper understanding of the experiment?

- How can I help the lab pairs/groups to work together well?

What are Some of the Best Practices to Follow During the Lab?

- Establish the specific goals of the lab (write them on the board)

- Prepare an outline (on the board) of the lab activities

- Do not hesitate to explain things more than once or answer questions that you may consider simple (this will likely save you from headaches later on)

- Demonstrate new techniques to the class or small groups

- Review safety issues for the lab

- Visit with each student individually during the lab

- Ask specific questions of the students in order to monitor their progress during the lab

- Provide ample feedback to students during the lab

What are Some of the Best Practices to Follow When Grading Lab Reports?

Grading Lab Reports (suggestions for providing constructive, formative feedback)

- Ensure that your grading scheme is consistent with course policy.
- Determine whether students understood the lab.
  - Assess whether many students missed a critical concept.
  - Evaluate whether students drew reasonable conclusions from the data they collected.
  - Reward creative and rational but unconventional thought in application of principles.
- Read, evaluate and return lab reports in a timely manner with cogent feedback.
  - Help students improve by telling them how they could have done better.
  - Focus comments in specific areas rather than on the report as a whole.

What Makes a Good Lab TA?

In their feedback to TAs, students indicate that they appreciate lab TAs who:

- Summarize the theory and procedure briefly before the students begin the lab.
- Demonstrate new techniques.
- Relate the lab to the lecture and to real world applications.
- Are willing to help and answer questions.
- Walk around and check with students to make sure that they are making progress.
- Ask questions that make students think more deeply about what they are doing and why.

What Safety-Related Matters Should I Consider?

Safety is always an important concern in teaching laboratories. Consult the faculty lab coordinator with questions about departmental safety policies. In particular, make sure that a brief "Lab

Guidelines and Safety Instructions" page is added to the lab manual and also posted in the lab room for easy access. Such a page must include clear instructions/info on:

Lab Environment and Conduct

Handling Equipment

Reporting and Returning Equipment

Preventing Electric Shock

Preventing Other Bodily Harm (e.g., Soldering Precautions)

Fire, First Aid, and Emergency Numbers

Also make sure that emergency equipment (fire extinguishers, first-aid kits) are easily accessible and known to students.

Are there any Training Courses I can Take for Lab Instruction?

Apart from FES organized trainings/meetings, it may be possible to find free online courses for improving lab instruction skills. One such course is offered free by Coursera (with a certificate).

[Teaching in University Science Laboratories (Developing Best Practice)](#)

What is an Open-Ended Lab?

A lab experiment may have different levels of "openness" in that how much it leaves to the students (see Tables below). In planning a lab course, special attention should be given to the experiments - such that they gradually become more open-ended.

Table-1. Level of Openness according to Schwab-Herron

Schwab/Herron Levels of Laboratory Openness			
Level	**Problem**	**Ways & Means**	**Answers**
0	Given	Given	Given
1	Given	Given	Open
2	Given	Open	Open
3	Open	Open	Open

Source: McComas (1997)

Table-2. Scientific Enquiry Rubric

Establishing the level of independence and autonomy expected of students to carry out an assessment task	
Level of Enquiry	**Description**
0	The problem, procedure and methods for achieving solutions are provided to the student. The student performs the experiment and verifies the results with the manual
1	The problem and procedure are provided to the student. The student interprets the data in order to propose viable solutions
2	The problem is provided to the student. The student develops a procedure for investigating the problem, decides what data to gather, and interprets the data in order to propose viable solutions
3	A "raw" phenomenon is provided to the student. The student chooses the problem to explore, develops a procedure for investigating the problem, decides what data to gather, and interprets the data in order to propose viable solutions

Source: Fav *et al.* (2007)

What if I Have More Questions?

Faculty Lab Coordinators and/or members of the ES Trainings Unit can be approached for further queries.

Sources:

- Science Teaching Reconsidered, National Academy Press, 1997
- Center for Instructional Development and Research, University of Washington
- Teaching Resource Center, University of Virginia
- Center for Teaching, Vanderbilt University

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ES Pedagogy – Best TA-ing Practices Handbook

What is this Handbook About?

Teachers' assistants (TAs) play a vital role in the successful course management and completion. At GIKI-FES typically graduate student are the TAs for various courses. The TA needs to know and review the course content, plan quiz review and explanation sessions, update student attendance record and maintain a detailed grade-sheet for the final grading in the end of the course. This handbook contains a variety of resources and role goals to help TAs to perform their duties effectively.

What are the Typical Tasks for a TA?

- Marking Attendance
- Maintaining Class decorum during the lecture
- Assist to conduct and to grade, course quizzes & assignments
- Conducting Quiz follow up session with students after every quiz
- Maintaining student's attendance record
- Maintaining student's grade-sheet
- Compiling the pre-finals
- Updating CMS (Attendance, Quizzes, Assignment and Exam score)
- Assist to compile and submit final grades
- Assist the instructor in completing the course file

What are Some of the Best Practices to Follow When Grading Quizzes?

- Ensure that your grading is consistent with the course policy/marking scheme
- Determine whether students understood the topic
- Evaluate and return quizzes in a timely manner with cogent feedback
- Help students improve by telling them how they could have done better
- Focus comments in specific areas rather than on as a whole

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What are Some of the Best Practices to Follow During the lecture?

- TAs should attend course lectures to better understand the content they will be grading
- Ensure that the attendance marked by the students is according to the actual number of students present in the lecture
- To be able to manage the class and maintain the decorum while the instructor presents
- To Provide technical support for lectures

Typical TA-ing Process

- Find out the course instructor you are going to assist
- Meet the instructor
- Discuss your role and expectations
- Get yourself associated as a TA to the course in CMS (your instructor will add you)
- Get the course outline, course books, reference books and additional notes
- Discuss the assignment and quiz schedules
- Upload attendance on CMS within 2 days of the lecture date
- Assist your instructor in invigilating the quizzes/exams
- Mark the quizzes, assignments, send the mark-sheet to the students and arrange a review session and resend the updated record within two weeks of conducting the quiz or assignment submission
- After every quiz, assignment and mid exam, choose 3 (best, average, worst) of the attempted quiz/assignment/mid samples from the class and submit it to your instructor with in two weeks for the preparation of the course file
- Keep all the sheets, assignments and relevant data in a safe spot (which the instructor knows about) and/or submit them to the instructor regularly
- Prepare the pre-finals and convey them to the students at least 1 week before the final examination
- Finalize and submit the course file as soon as the grades have been submitted to the Dean's office

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What to Remember?

- You are here to help students and assist the instructor
- To maintain a formal relationship with the students through email and verbal communication with students
- To be sensitive towards student problems
- To Update the Grade-sheet regularly
- Always provide every mark-sheet/record to the instructor both in pdf and editable form (a preferable way is to create a shared folder)
- Be mindful of sending a pdf version of the files to the students
- Cc the instructor on all email with students concerning the course
- Always feel free to let your instructor know if you are uncomfortable with an assigned task
- Discuss academic honesty policies and procedures. If you detect unfair means, inform the course instructor for appropriate action

What will help Me?

- Automated attendance and assignment record
- Automatic sheet for preparing the pre-finals (Blank_Gradesheet_FES)
- Some beginner level skills in MS Excel (i.e. Applying formulas)

What if I Have More Questions?

CMS coordinator and/or members of the ES Pedagogy & Training Unit can be approached for further queries.

FES Annual Broad OBE Calendar		
Item	**When?**	**Who?**
OBE Workshop	Start of the academic year	All staff
TeachWell program assignment	Before start of the semester	New faculty
CLO and Course/Lab Outline Quality Review Meetings	Start of Semester	OBE Coordinator, Dean FES, Instructors, Lab Engineers
Mid Exam Quality Check	Before Mid Exam	Small peer groups
Course CEP Assessments and Course Quality Review Meetings	Mid-semester	OBE Coordinator, Dean FES, Instructors
Instructor Self-Assessment Form Submission	Mid-semester	Dean FES, Instructors
OEL, Review	Mid-semester	OBE Coordinator, Dean FES, Instructors
Final Exam Quality Check	Before Final Exam	Small peer groups
Course File, Lab File Review Meetings	After the semester	Dean FES, Individual Instructors, Lab Engineers
OBE CQI cycles and data	Summer	OBE subcommittees, OBE Coordinator, Dean FES
Faculty Study Board, Faculty Industrial Advisory Board meetings	Annually	Dean FES, FSB/InAB Coordinator
OBE Progress Meetings	Fortnightly	OBE Coordinator and subcommittees

FES TeachWell Program

FES TeachWell Program

What is the Program About?
FES TeachWell Program is aimed at providing a mechanism for gradually improving faculty/instructor teaching skills. Dean office may place instructors in the program based on instructor request, observed need, student feedback, and/or course file reviews.

What is Typical Duration of the Program?
An instructor may be placed in the program one semester at a time.

What is Included in the Program?

1. Course Mentors
Course Mentors will be allocated to the instructor to guide/advise him/her on all the aspects of course delivery and good teaching practices. Course Mentors shall be senior/experienced faculty members and a separate Course Mentor may be allocated for each course the instructor is teaching.

2. Weekly Lecture-Plan and Assessment-Plan Meeting
Instructor shall discuss his/her teaching plan and material with the Course Mentor before the lecture is delivered. Instructor shall also have his/her assessment material and grading methods reviewed by the Course Mentor.

3. Monthly Reflection Statement and Dean Meeting
Instructor shall submit a brief Reflection Statement to Dean's office on his/her teaching (methods, challenges, improvements) every month. Instructor shall also present/discuss his/her course progress with Dean in a monthly meeting.

4. Lecture Audit
Instructor shall make arrangements with Course Mentor to attend some of the Mentor's lecture for learning purposes. In addition, instructor shall invite mentor to attend some of his/her lectures and provide review for improvement.

5. Pedagogy Courses and Reading Assignments
Instructor may be assigned pedagogy courses (recorded/online/physical) that he/she must attend. In addition, Instructor may be given pedagogy-related reading assignments.

Units Involved
FES Pedagogy and Trainings Unit shall assist Dean FES in implementation of the program.

What if I Have More Questions?
Dean's office and/or members of the ES Pedagogy & Training Unit can be approached for further queries.

Instructor Self-Assessment Form (Mid-Semester)

Course Code: _____ Course Title (+Section): _____

Semester/Year: _____ Instructor Name: _____

Previous course file was consulted to see any suggested improvements.

Compliance Level (0-100%) _____

Course Outline was reviewed and given to students in the first week.

Compliance Level (0-100%) _____

Attendance record was provided to students every week.

Compliance Level (0-100%) _____

Assessment results were provided within two weeks of each assessment.

Compliance Level (0-100%) _____

Assessments were well-distributed over the eight weeks.

Compliance Level (0-100%) _____

CLOs were mentioned on all assessments, and it was ensured that assessment levels match claimed taxonomy.

Compliance Level (0-100%) _____

Student feedback was regularly sought to see if they are facing any special difficulties regarding course content, delivery, or management.

Compliance Level (0-100%) _____

Students with severe performance or attendance issues were counseled or reported to advisor/Dean.

Compliance Level (0-100%) _____

Review meeting for CEP (where applicable) was held with Dean and CEP given to students by Mid-Semester.

Compliance Level (0-100%) _____

Lab Engineer's work (where applicable) was constantly supervised to ensure quality of lab experience and availability of lab resources

Compliance Level (0-100%) _____

General Reflection on the Course Delivery so Far:
_____

_____

Instructor Signature

_____

Dean FES

Note: Instructor to fill in compliance levels (0-100%) and general reflection and submit to Student Office at Mid-Semester. Document to be added to course file with Dean's signature.

FES Professional Training Program

FES Professional Training Program (PTP)
FES values high quality research and teaching, innovation, respect for colleagues and students, and hard work and integrity at the workplace. The purpose of this plan is to enhance professional growth, development and vitality, as workplace training programs help employees learn different skill sets to perform their daily tasks efficiently, improve overall performance, develop efficiency, and avoid violations of laws and regulations of the institute which leads to greater retention of employees and job satisfaction over time. FES encourages the faculty/staff to attend wellness activities, professional development workshops and develop a framework to evaluate your research, teaching, and service activities based upon your individual needs and departmental/university criteria, and identify any specific activities that will enhance the skills needed to succeed in your current role. Everyone should:
Become familiar with department and university policy and procedures, including key dates and timelines, levels of approval, and specific criteria developed by the FES.
Complete a short course on the following topics after every two years.

Diversity and Inclusion Training
It's important to understand how to treat everyone with respect and empathy to form an inclusive culture that provides all team members with the opportunity to feel comfortable, valued, and accepted for who they are. The following online courses can help in this regard:
Diversity, Equity, and Inclusion (DEI) playlist consisting of 9 short modules

Equity and Inclusion Lens
Introduction to Unconscious Bias
Address Your Unconscious Biases
Respect Ethnic & Racial Differences
Reduce the Harm of Microaggression in the Workplace

Conflict Resolution
It is to improve the interpersonal skills to calmly and respectfully handle conflicts that arise, so that disagreements are resolved before they escalate to serious issues.

Feedback Handling

Mental Health and Stress Management
It is to reduce any toxic stress and negativity in the workplace and improve overall job satisfaction. The following course addresses this topic:

Sexual Harassment

Digital Literacy
Protect Your Computer from Attack