GUIDELINES FOR EFFECTIVE TEACHING

IIT GANDHINAGAR

PREFACE

IIT Gandhinagar wishes to set exemplary standards in academics and research. Central to this goal is adoption of some of the best practices in the planning, organization, and conduct of courses that are taught at the Institute. The aim of developing this document is to explicitly lay out some of these best practices in course conduct, and encourage their implementation. While developing this content, inputs have been drawn from other reputed institutions from India and abroad.

This document has not been developed as a “rule book”. Rather, it is designed to serve as a guideline to help develop and maintain a high teaching standard in the Institute. It also highlights the freedom and flexibility in the operation of courses. It is hoped that widespread adoption of these practices will enable us to improve and sustain the quality of instruction at the Institute.

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1. Class schedule

Courses at IIT Gandhinagar (IITGN) are typically scheduled to run between 8 AM and 6:00 PM. All classes start 5 minutes past the hour and end on the hour (i.e., the first class is at 8:05 AM, and ends at 9:00 AM). It is expected that instructors will begin the lecture in a timely manner, and be punctual with the class start and end times (both in the offline and online modes of teaching). This is important in order to ensure that students are not delayed for their next class. This also provides the next instructor time to set up the class (in offline mode of instruction). Instructors must also ensure that students reach the class on time, and are encouraged to monitor punctuality of students.

The time-table at IITGN is managed centrally. It is advisable that all courses be held during the time-slot assigned by the academic office. Any rescheduling of assigned time-slots may be done in consultation with the pre-registered/registered students and the Dean / Associate Dean, Academic Affairs. Classes may be rescheduled after written consent has been obtained. Similarly, mid-semester and end-semester exams must be conducted within the assigned time-slot only.

Each discipline is expected to slot at least one core course in the 8:05 – 9:00 AM time slot. This is important so that spillover of core courses into the afternoon slots is avoided and these slots can be better utilized for labs and elective courses.

A 4 credit course typically involves 40 lecture hours over the semester. It is advisable to not miss any classes. If a class is missed due to the unavailability of the instructor, it should be compensated via a make-up class decided in consultation with the registered students so that the 40 lecture hours are maintained.

2. Course Planning and Operation

Thorough preparation is fundamental to effective and smooth operation of courses. Preparation begins with development of a detailed and rigorous semester-long course plan for each course. A course plan typically includes course objectives, modes of student engagement in the course, textbooks and references, grading policies, academic integrity policies, and a breakdown of topics to be covered in each lecture. This course plan is to be added in the timetable before registration and should also be discussed on the first day of class, so that they can make an informed decision about the courses in which they are enrolling. It is advisable to structure the course plan in accordance with the desired learning outcomes. It is recommended that learning outcomes be identified clearly in the course plan. Further, it is advisable that the course is planned in such a way that there is continuous engagement of students and the course provides an immersive learning experience through assignments, projects, and other hands-on learning modules.

The course plan must indicate the mechanisms to assess the understanding of students on the topics covered (homework, assignments, projects, reports, papers, quizzes, exams, assignments, etc.). Because students will be studying multiple courses during any given semester, information about the evaluation mechanisms for different courses may help them to prepare their study schedule in advance. The instructors are also encouraged to include the dates of all evaluation components in the course plan - this way the semester is neatly planned out for the students. In addition, for courses run in online mode, the instructors are strongly encouraged to share the video recordings of each lecture on the classroom website. The feedback suggests that this step is crucial and very useful to the students.

It is important that students in all disciplines get a sense of how the material they are studying is relevant in the “real world”. When preparing the course plan, faculty members are strongly encouraged to think about real-life examples, demonstrations, and experiments that could be incorporated to give this sense to students. All demonstrations to be conducted during class hours may be planned prior to the beginning of the course. The students are to be encouraged to attend, ask questions, and to enthusiastically learn from the demonstrations. To cultivate interest, the descriptions of demonstrations may be made available to the students beforehand. In addition, if the demonstration involves a video recording, it would be beneficial if this recording is shared before or after the actual demonstration.

Faculty members are also encouraged to espouse active learning strategies and practices in their courses. These include an emphasis on learning-by-doing, numerical simulations, doing-before-learning and wherever possible, “making”. Such practices have been shown to enhance student learning through deeper engagement and more hands-on experiences. In addition, the instructor may invite subject experts for providing additional perspectives to enhance the in-class teaching-learning experience; these lectures are expected to be over and above the lecture hours associated with the course.

For courses that are taught by faculty from multiple disciplines (for example, Engineering Graphics, Thermodynamics, Fluid Mechanics, Solid Mechanics, etc.), it is expected that the course plan be developed jointly by all the participating faculty members / disciplines. This may require extensive consultations and agreement on quizzes, assignments, tutorials, problem sets, and exams. These deliberations are expected to be held well before the start of the semester, and a periodic review may be conducted over the semester.

It is also important that students in such courses gain an understanding of a particular concept via exposure to problems from many disciplines. For instance, problems from Materials Science, Mechanical Engineering, and Civil Engineering may be used to enhance understanding of a concept in Solid Mechanics. This is to

be discussed by the course instructors and tutors, and the course material may be prepared accordingly.

Similarly, for large courses that involve multiple instructors and tutors (for example, Introduction to Life Sciences, World Civilizations, Computing, etc.), synchronization between the instructors and tutors is essential. Instructors and tutors are strongly encouraged to jointly plan the entire operation of the course before the beginning of the semester. The tutors are expected to attend all the lectures. In addition, the instructors should ensure the weekly “course volume” match across sections so that the course remains properly synced across the groups. It is advisable that the team of instructors and tutors meet on a weekly basis to ensure good coordination throughout the entire semester.

Industrial visits are highly encouraged by the Institute. It is recommended that the course plan include all planned industrial visits and expectations that would be met through such visits. The enthusiastic participation of students is necessary to achieve the learning outcomes of industrial visits. Instructors must also ensure that there are no last minute changes to the visiting schedule that is decided with the industry colleagues.

The students may be unable to have all their questions answered during the lecture or tutorial sessions due to limited time. Therefore, it is advisable to have well-publicized office hours during which instructors, tutors, and TAs are available for consultation. A large class could be broken up into many sections with an instructor/tutor/TA in charge for each section.

A full course must be taught by a single instructor. In situations where two or more faculty members must share teaching (as instructors), permission must be sought in advance with full justification. Change of instructors for an ongoing course is not advisable. In exceptional circumstances, a change of instructor may be recommended by the discipline (with justification) and approved by the Dean, Academic Affairs. In addition, it is desirable that faculty learn from each other with regards to best teaching practices. Thus, a discipline-specific (or interdisciplinary) meeting can be scheduled ahead of the semester to share views and opinions about teaching certain courses.

Further, each discipline must ensure equitable distribution of course load across faculty over time. For instance, basic courses that have a large number of students may be rotated between faculty every couple of years or so. Similarly, large basic courses may be split into smaller sections as and when needed and possible to give faculty exposure to teaching basic courses and to enhance student learning.

3. Learning Outcomes

The success of the academic program depends on the ability of students to make connections between concepts across courses and developing an intuition towards applying these concepts in real-world situations. An effective way to design a unit of instruction is to then think about what students should know and how they should effectively use that acquired knowledge. Instead of viewing learning outcomes as a determinant of efficacy of the course at the end of the semester, faculty are encouraged to design the course such that learning outcomes at the end of each unit are clear and is thus an evolving concept. Specifying intended learning outcomes for students will also enable effective design of teaching and learning activities that might help students achieve those outcomes. Likewise, learning assessments should also be aligned with the intended learning outcomes. The knowledge of learning outcomes for each course may also be useful for the evolution of the curriculum in the long run. Instructors are therefore encouraged to clearly spell out learning outcomes in the course plan, possibly in a modular fashion, preferably on a topic-by-topic basis. To ensure students are on course to achieve the desired learning outcomes, instructors might want to schedule additional (possibly online) office hours in addition to the regular ones.

4. Attendance Policy

It is recommended that the instructor follows an attendance and class participation policy. The minimum attendance requirement, its weightage in grade evaluation if any, policy on make-up exams etc. should be communicated at the beginning of the course and should be included in the course plan. The students may also be made aware of the “Self-Learning Mode”, the information for which is provided in Annexure 1. In case of extended absence by a student, the instructor may work with the student to develop a plan to make up for the missed course work.

5. Textbooks and other Reference material

A key feature of effective teaching is the selection of instructional materials that meet the needs of students and fit the constraints of the teaching and learning environment. As the students will likely be studying multiple courses during a semester, they may find it convenient to refer to a standard textbook for a course. Therefore, the instructors are strongly encouraged to follow standard textbooks by prominent author(s) in the field, and if possible, with additional resource material such as video lectures by the author(s), extra problem sets, etc. Furthermore, instructors must develop a tradition of following the same book for an extended period of time, and frequent changes in the textbook must be avoided. The instructors should also ensure that multiple copies of the prescribed textbooks are available in the library prior to the beginning of the course. The library team can also help with the procurement of textbook for students at discounted rates.

Students, particularly at the undergraduate level, may need additional guidance beyond course material and classroom teaching. This can be provided by means of appropriate reference material. These references should be mentioned in the course plan, and efforts should be made towards making them easily available to students.

6. Continuous Evaluation

Instructors are free to select assessment methods of their choice, including but not limited to assignments, projects, quizzes, examinations, presentations, etc. However, performance of students must be tracked throughout the duration of the course. It is also preferable to have a mid-semester and end-semester examination as per the Institute schedule. Any departures from the institute schedule for the mid-semester and end-semester examinations should be communicated in advance to the students and require permission of the Dean, Academic Affairs. Instructors may also ensure that the assessments are distributed uniformly throughout the semester. For example, the number of quizzes should be approximately the same before and after the mid-semester. Along similar lines, instructors must avoid clubbing too many evaluations towards the end of the semester.

The weightage given to different assessment components should be fairly distributed and announced to the students at the start of the course. Any modification of the grading scheme or the weightage of components during the course must be avoided. Such modifications can possibly negatively influence the study schedule of students. Makeup exams are discouraged except under extreme circumstances. Students must be made aware of the policies for makeup examinations by the instructor.

For the examinations/assessments, there is a provision for providing compensatory time to students with Benchmark Disabilities. PwD students (with a minimum 40% disability) may be allowed compensatory time at the rate of 20 minutes per hour in all the examinations.

7. Timely feedback to Students

Students can immensely benefit from obtaining feedback on their performance in assignments, projects, quizzes, and examinations etc. in a timely manner. It is expected that the assessments are graded and returned to students without any delay. The students must be given an opportunity to see each of the graded assessments after grading has been completed. It is highly encouraged to hold special office hours to provide feedback to students and to clarify any doubts and answer any questions. Since the end-semester examination is generally the final point of evaluation for a course, it is advisable to share the results of all evaluations with each student by the last week of the classes. This will help in the identification and rectification of any inadvertent mistakes in entry of marks before the grades are being finalized. Further, as explained in the Academic Affairs advisories, students

must be given an opportunity to see their graded answer scripts of end-semester examination before submission of grades i.e. within 72 hours after the day of the end-semester examination. The instructor may therefore plan accordingly. In addition to the results of the above assessments, the instructor is expected to regularly interact with underperforming students and provide them detailed feedback about their performance.

8. Feedback from Courses and Course Review

The views expressed by students can help the instructor know if the learning outcomes are being met from a student's perspective, how students perceive the course material, the pace of instruction, etc. The mid-semester feedback and the detailed feedback collected before the end-semester examination are shared with the instructors and tutors. The Instructor may take the above feedback into consideration while preparing the course plan and teaching the same course in the future.

In addition, disciplines should encourage feedback from students in informal settings like discipline-level town hall meetings or open houses. Discipline coordinators should further ensure that each course is reviewed at least once every three years. It is advisable that a schedule is established in order to minimize over-surveying stakeholders and to ensure that courses are reviewed systematically in a cycle. Course reviews should focus on the conduct of the course, appropriateness of the content, student engagement, and assessment methods in order to achieve the learning outcomes, and the consistency and relevance of the objectives of the course with the academic program.

9. Grading

The instructor may take the help of teaching assistants in evaluating the assignments submitted by the students. However, the instructors are expected to evaluate the answer scripts of the examinations by themselves. The instructors are advised to prepare a grading key for all assignments, quizzes, and examinations etc. in order to ensure consistency in grading across all students. The instructor is generally free to use the grading policy of their choice with regard to weightage to different assessments over the semester. However, such a policy should be announced to the students at the beginning of the course; any modification of the policy during the course is discouraged. The broader grading system is common across the Institute and details on the same are available in the Academic Affairs advisories. It is advisable to share the results of all evaluations with each student by the last week of the classes. This will help in the identification and rectification of any inadvertent mistakes in entry of marks before the grades are being finalized. Further, as explained in the Academic Affairs advisories, students must be given an opportunity to see their graded answer scripts of end-semester examination before

submission of grades. Grades are required to be submitted within 72 hours of the conduct of the end-semester examination of the course. If the grading for a particular course appears to be too liberal or too harsh, the Dean, Academic Affairs may flag the course to the Chairman, Senate, and a moderation of grades may be requested.

Though the instructor is responsible for all evaluations and the assignment of grades, it is strongly advised to involve the tutors of the course in the above-mentioned activities. It is also desirable that new faculty members teaching for the first time be made aware of these practices by the discipline coordinator.

10. Role of Teaching Assistants

The Teaching Assistants (TAs) are an important part of any course, and must be utilized properly so as to become an excellent resource to the students. For effectiveness, TAs must be informed about their duties prior to the beginning of the course. The TA allocation should be done at least 15 days before the commencement of the course. This will help in the overall planning of the course and ensure that the TAs are briefed and fully prepared and trained. The instructor should encourage the TAs to attend lectures and tutorials, so that they know exactly what is covered and can provide the right assistance to the students. However, TAs are not permitted to independently conduct lectures or tutorials (these must be conducted by faculty). TAs are also not permitted to grade the mid-semester and end-semester examinations. Graduate Teaching Fellows (GTFs), with prior approval, could be responsible for the conduct of the entire course as an independent instructor or tutor. The instructor should ensure that the TAs perform their duties like grading of assignments, holding regular office hours, etc. in a regular manner and by respecting the Honor code of the Institute.

11. Lab Courses

The graduate and undergraduate curriculum at the Institute contains a substantial number of lab courses to help students get an applied sense of theoretical concepts covered in lectures. Experiments and projects in these courses should be designed keeping in mind the following goals:

- Develop intuition and deepen understanding of concepts.
- Apply concepts learned in class to new, real-world situations.
- Develop critical, quantitative thinking.
- Develop experimental and data analysis skills.
- Develop reporting skills (written and oral).
- Practice collaborative problem solving.

To ensure that lab exercises run smoothly, experiments must be carefully planned. The instructor and TAs must be present during the lab sessions. The TAs must be fully trained on the experiments and safety protocols, and in consultation with the

instructors, should rehearse the procedure before the lab sessions. It is desirable that the instructor makes sure all the TAs perform the experiments well in advance and are aware of all the scientific and technical (instrumentation) aspects of the experiment in order to guide the students effectively. If necessary, a separate workshop might be conducted by the discipline for all the TAs before the beginning of the semester so they step into their roles well prepared. All safety protocols should be explained to the students at the start of the course. Student learning may be assessed via impromptu viva sessions, reports or other means. Brief discussions about the lab exercises during the lecture hours may further enable a better understanding of the theoretical concepts and also gauge student understanding.

12. Project Courses

Students typically undertake project courses (for example, IN 791, IN 792, CL 399, etc.) to gain research experience in a particular topic. To ensure effective guidance and student learning, an instructor may want to limit the number of project students that he/she is willing to supervise. It is also recommended that the students are informed about the project objectives, expectations and meeting schedule at the start of the semester. Since the students pursuing a project may be new to the research area, they will benefit from the regular meetings with the instructor. The instructors are expected to continuously evaluate students' working on the projects. The students should be encouraged to make a presentation and submit a project report/term paper at the end of the semester on the subject matter along the lines of a typical scholarly publication.

In addition to courses that are solely project-based, faculty members are encouraged to include small projects in regular courses as well - this ties in with the active learning environment that IITGN aims to provide and promote.

13. Tutorials

An effective tutorial session enables students to gain a better understanding and appreciation of the fundamentals and concepts. Students learn to apply the concepts and fundamentals taught in a course to solve a variety of problems. Tutorials must not be converted into lecture hours. Tutorials are to be run by faculty or graduate teaching fellows (GTFs) approved for this purpose. Teaching Assistants should not conduct tutorial sessions. Tutorial batch sizes should be as small as possible, certainly not more than 40.

For multi-disciplinary courses (e.g, thermodynamics, solid mechanics, etc.), each concerned discipline is expected to contribute a tutor for a course. It is expected that each tutor brings in the respective discipline's flavor into the course. A meeting of

tutors should be scheduled well in advance, and tutorial (and possibly also assignment) problem sets should ideally be finalized before the start of the semester.

A tutorial problem set may have sufficient problems of varying degrees of complexity to meet student diversity. Simpler problems help to build the student's confidence, while complex problems challenge the student's thinking. Further, wherever possible, the problems should have relevance to practical (or real world) applications so that the students can see the connection between concepts and applications.

14. Instructor Conduct

Instructors are expected to show civil and courteous conduct when interacting with students in the classroom or otherwise. It is important for instructors to recognize that any student performing poorly in a course, not attending class or facing other challenges still needs to be treated in a dignified and respectful manner. Instructors must attempt to understand students' difficulties, address them and bring them to the attention of all concerned stakeholders.

Particular care and concern should be shown to differently-abled students who might have trouble grasping the subject material and whose pace of learning might not match with the rest of the class. Consideration for this aspect should be provided, and if necessary, a separate mode of examination may be conducted in consultation with the student(s).

15. Honor Code

Instructors are encouraged to discuss the Honour Code (as provided in the Student Affairs Advisories) with the students at the beginning of the course. Faculty members may also:

1. Create awareness to ensure that expectations regarding academic integrity are understood, and that students are held accountable for conforming to such expectations.
2. Use good judgment in setting and communicating clear ground rules for academic work conducted under their supervision.
3. Maintain proper protocols during the administration of examinations
4. Avoid reusing prior examinations in whole or in part to the extent possible.

ANNEXURE 1

SELF-LEARNING MODE

(As approved by the Senate in its 3rd meeting held on 19th July 2010)

Regular attendance in lectures and tutorials is a key factor in enhancing student performance. The fully residential character of IITGN would be expected to correlate with greater attendance in the classroom. The Institute does not prescribe any attendance policy and all decisions pertaining to attendance related issues are entirely left at the instructor's discretion. The institute has a provision of study in self-learning mode bearing the following features:

- Students absenting themselves for more than 3 classes during the first 3 weeks, or, more than 6 classes during the first 5 weeks to be declared to be in the "self-learning mode" for that particular course.
- Such students will thereafter be free not to attend any more lectures of that particular course. Their names will be removed from the attendance sheet. They need not submit any assignments; if they do, those will not be graded. They need not appear in any quizzes or mid-semester examinations; if they do those too will not be graded.
- The performance of such students will be evaluated on the basis of the end semester examination score alone. That is, their final examination score will be compared with that of the other students (who are not in self learning mode) and the grade will be awarded accordingly (see illustrative example below).
- The parents of students going on the "self learning mode" are liable to be informed of this. In particular in cases of first year students and those in higher classes whose CPI is below average.
- The list of students going on the "self-learning mode" will be provided to the Scholarships Committee of the Institute, which will be free to use this input in deciding the award of scholarships for the next year.
- In case of laboratory courses, every student is expected to attend all the laboratory sessions failing which they are liable to be awarded a Fail grade as applicable.
- In case of medical or other emergencies, timely permission should be sought from the instructor and deficiencies should be suitably made up.

Illustrative Example:

Assume that the evaluation of a course is based on assignments, quizzes, a mid-semester exam and an end-semester exam. Let us take the case of three students: student X is in self-learning mode (and will therefore be evaluated only on the end-sem exam performance), while the other two students (Y and Z) are not. Now, X, Y and Z all get the *same marks on the end-sem exam*. However, Y and Z have also submitted assignments, taken quizzes, etc. Based on their cumulative performance on all these, say the grade for Y at the end of the course is a C (because he/she did poorly on several evaluations) while the grade for Z is an A- (because he/she did well on most evaluations). Now the grade for student X, who is in self-learning mode, can be either a C, or an A-, or any grade in between. This is at the discretion of the course instructor.